

NAVAL POSTGRADUATE SCHOOL

Monterey, California



THESIS

**GARRISON BASED INTRANET PROTOTYPE FOR THE
40TH INFANTRY DIVISION (MECHANIZED)**

by

Nelson T. Heckroth
and
Thomas M. Olson

September, 1997

Thesis Advisor:
Second Reader:

Suresh Sridhar
Tung Bui

Approved for public release; distribution is unlimited.

19980106 034

DTIC QUALITY INSPECTED 4

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.

1. AGENCY USE ONLY (Leave blank)

2. REPORT DATE
September 1997

3. REPORT TYPE AND DATES COVERED
Master's Thesis

4. TITLE AND SUBTITLE

Garrison Based Intranet Prototype for the 40th Infantry Division (Mechanized)

5. FUNDING NUMBERS

6. AUTHOR(S)

Heckroth, Nelson T. and Olson, Thomas M.

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Naval Postgraduate School
Monterey, CA 93943-5000

8. PERFORMING ORGANIZATION
REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSORING / MONITORING
AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

12a. DISTRIBUTION / AVAILABILITY STATEMENT

Approved for public release; distribution is unlimited.

12b. DISTRIBUTION CODE

13. ABSTRACT (maximum 200 words)

This thesis introduces the concept of an Intranet, chronicles the efforts required to create and deliver an Intranet, and provides a discussion of advantages and disadvantages of using an Intranet. It demonstrates that an Intranet can be a useful mechanism to solve problems related to information control and distribution for the reserve component of the 40th Infantry Division (Mechanized).

The thesis contains a detailed description of the rapid prototyping process model, as well as the modifications required to adapt the process for Intranet development. Further, it describes the gathering of system requirements using the results of several structured walk-throughs. It also describes, in detail, the development efforts to address each of the requirements identified.

The prototype developed as part of this thesis demonstrates several key aspects of Intranet development and deployment. For example, it incorporates webpage development using Commercial-Off-The-Shelf products common to the division, and the development of interactive functions with spreadsheet and database programs. This thesis also addresses issues such as security and content control which are crucial for Intranet deployment.

14. SUBJECT TERMS

Intranet, infantry division, information control, rapid prototyping process, webpage development, Commercial-Off-The-Shelf

15. NUMBER OF
PAGES

158

16. PRICE CODE

17. SECURITY
CLASSIFICATION OF REPORT
Unclassified

18. SECURITY CLASSIFICATION OF
THIS PAGE
Unclassified

19. SECURITY CLASSIFI- CATION
OF ABSTRACT
Unclassified

20. LIMITATION OF
ABSTRACT
UL

Approved for public release; distribution is unlimited

**GARRISON BASED INTRANET PROTOTYPE FOR THE 40TH INFANTRY
DIVISION (MECHANIZED)**

Nelson T. Heckroth
Major, United States Marine Corps
B.A., Oregon State University, 1985
and
Thomas M. Olson
Major, United States Army
B.S., South Dakota State University, 1983

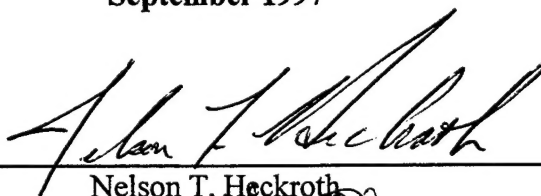
Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN INFORMATION TECHNOLOGY MANAGEMENT

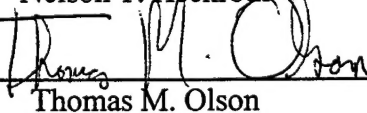
from the

**NAVAL POSTGRADUATE SCHOOL
September 1997**

Authors:

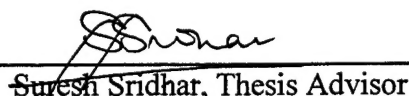




Nelson T. Heckroth



Thomas M. Olson

Approved by:


Suresh Sridhar, Thesis Advisor
Tung Bui, Second Reader
Reuben T. Harris, Chairman
Dept. of Systems Management

ABSTRACT

This thesis introduces the concept of an Intranet, chronicles the efforts required to create and deliver an Intranet, and provides a discussion of advantages and disadvantages of using an Intranet. It demonstrates that an Intranet can be a useful mechanism to solve problems related to information control and distribution for the reserve component of the 40th Infantry Division (Mechanized).

The thesis contains a detailed description of the rapid prototyping process model, as well as the modifications required to adapt the process for Intranet development. Further, it describes the gathering of system requirements using the results of several structured walk-throughs. It also describes, in detail, the development efforts to address each of the requirements identified.

The prototype developed as part of this thesis demonstrates several key aspects of Intranet development and deployment. For example, it incorporates webpage development using Commercial-Off-The-Shelf products common to the division, and the development of interactive functions with spreadsheet and database programs. This thesis also addresses issues such as security and content control which are crucial for Intranet deployment.

TABLE OF CONTENTS

I.	INTRODUCTION.....	1
A.	BACKGROUND	1
B.	WHAT IS AN INTRANET?	2
C.	CONTENTS.....	2
1.	Introduction.....	2
2.	Intranet	2
3.	The Customer	3
4.	The Prototyping Process.....	3
5.	Identification of Basic Requirements.....	3
6.	The Prototype.....	4
7.	Recommendations for Intranet Operations.....	4
II.	INTRANET	5
A.	INTRODUCTION.....	5
B.	ADVANTAGES OF INTRANET USE.....	5
1.	Simplified Information Access.....	5
2.	Enhancement of Communication and Collaboration.....	5
3.	Productivity Enhancement.....	6
4.	Decision Support.....	6
5.	Affordability	7
6.	Ease-of-Use	7
C.	INTRANET TECHNOLOGIES.....	7
1.	The Client/Server Model.....	7
D.	HARDWARE AND SOFTWARE REQUIREMENTS.....	11
E.	INFORMATION CREATION AND CONSUMPTION.....	12
1.	Content Creation.....	14
2.	Analysis and Data Access	14
3.	Collaboration.....	15
4.	Publishing	15

F.	CONCLUSION	15
III.	THE CUSTOMER.....	17
A.	INTRODUCTION.....	17
B.	BACKGROUND	17
1.	History.....	17
2.	Organization.....	18
3.	Structure	20
4.	Mission	22
C.	RESERVE COMPONENT AUTOMATION SYSTEM.....	23
1.	Background	23
2.	Scope.....	25
3.	System Architecture.....	26
4.	System Data and Applications.....	30
5.	RCAS Development	32
D.	CURRENT STATUS.....	33
IV.	THE PROTOTYPING PROCESS.....	37
A.	INTRODUCTION.....	37
B.	THE PROTOTYPE DEVELOPMENT MODEL.....	37
C.	SCOPE	42
D.	CURRENT INFORMATION OPERATIONS.....	43
E.	ADAPTATION OF THE PROTOTYPE PROCESS FOR A MILITARY INTRANET.....	44
F.	CONCLUSION	46
V.	IDENTIFICATION OF BASIC REQUIREMENTS.....	49
A.	INTRODUCTION.....	49
B.	BACKGROUND	49
C.	PERSPECTIVE.....	50

D.	REQUIREMENTS.....	50
E.	CONCLUSION	62
VI.	THE PROTOTYPE.....	63
A.	INTRODUCTION.....	63
B.	DEVELOPING A WORKING PROTOTYPE.....	63
C.	INTERMEDIATE STEPS.....	72
1.	Demonstration of the Prototype and User Satisfaction.....	72
2.	Gather Follow-on Requirements	73
D.	ENHANCEMENTS TO THE PROTOTYPE.....	73
E.	OPERATIONAL PROTOTYPE.....	87
F.	CONCLUSION	87
VII.	RECOMMENDATIONS FOR INTRANET OPERATIONS.....	89
A.	INTRODUCTION.....	89
B.	INTRANET POLICY.....	89
1.	Security	90
2.	Content.....	90
3.	Applications	91
4.	Servers.....	92
5.	Client	93
C.	LESSONS LEARNED AND RECOMMENDATIONS.....	94
1.	Responsibility	94
2.	Strategic Level Planning.....	95
3.	Intranet Advisory Team	96
4.	Intranet Policy	97
5.	Funding	97
6.	"Open" Technical Solutions.....	98
7.	Patience	98
a.	Crawl.....	98
b.	Walk	100
c.	Run	102

8. Intranet Promotion	102
D. CONCLUSION	103
APPENDIX A. TRIP REPORT 1.....	105
APPENDIX B. TRIP REPORT 2.....	111
APPENDIX C. DESCRIPTION OF MAJOR REQUIREMENTS.....	121
APPENDIX D. GUIDANCE FOR THE MANAGEMENT OF ARMY WEBSITES.....	129
LIST OF REFERENCES.....	133
INITIAL DISTRIBUTION LIST.....	137

LIST OF FIGURES

Figure 2.1: Client/Server Dialog.....	8
Figure 2.2: Browser/Server Communication.....	10
Figure 2.3: Information Production and Consumption Cycle.....	13
Figure 3.1: 40th Division Organization	19
Figure 3.2: An Army Staff.....	20
Figure 3.3: Major Command Locations.....	22
Figure 3.4: Original RCAS Configuration.....	25
Figure 3.5: RCAS Server/Workstation Environment	27
Figure 3.6: RCAS Red Architecture Solution.....	29
Figure 3.7: RCAS Black Architecture Solution.....	30
Figure 3.8: RCAS Database Architecture.....	31
Figure 3.9: RCAS Deployment Site Locations.....	32
Figure 3.10: RCAS Unit Distribution.....	33
Figure 4.1: The Waterfall Model	38
Figure 4.2: The Prototype Model.....	39
Figure 4.3: The Nested Development Loop.....	41
Figure 4.4: Migration of Scope.....	45
Figure 4.5: DIMAC Role	46
Figure 4.6: Modified Prototype Model	47
Figure 5.1: SIDPERS Procedure.....	52
Figure 5.2: Level Zero Diagrams of SIDPERS Procedure	53

Figure 5.3: Context Level Diagram of USR Procedures	54
Figure 5.4: Level Zero Diagram of USR Procedure.....	55
Figure 5.5: Level Zero Diagrams of Personnel Status.....	56
Figure 5.6: Dark Night Procedures	61
Figure 6.1: Left Frame Layout.....	64
Figure 6.2: Right Frame Layout.....	65
Figure 6.3: Opening Screen	66
Figure 6.4: G-4 Selected	67
Figure 6.5: 1st Brigade Home Page.....	68
Figure 6.6: Data Entry Screen.....	69
Figure 6.7: Personnel Master Report Spreadsheet.....	71
Figure 6.8: Microsoft Schedule in HTML Format.....	72
Figure 6.9: MS Access Switchboard.....	74
Figure 6.10: Query Response Page.....	75
Figure 6.11: Connection to USR Templates.....	75
Figure 6.12: Event Calendar Index Page	76
Figure 6.13: Division Directory Page	78
Figure 6.14: Portion of G-1 Required Report Page	79
Figure 6.15: Intelligence Newsletter.....	80
Figure 6.16: Sample Dark Night Page	82
Figure 6.17: NetMeeting.....	83
Figure 6.18: Report/Action Suspense Page	84
Figure 6.19: G-4 Home Page	85

Figure 6.20: Convoy Request Opened Within Browser	86
---	----

The authors of this thesis would like to express their sincere appreciation to the staff of the 40th Infantry Division. Without their complete support and dedicated assistance, presenting the concept and possibilities of the Garrison Intranet would not have been possible.

I. INTRODUCTION

A. BACKGROUND

In October of 1996, the 40th Infantry Division (Mechanized) lost its ability to transmit data electronically when the state's primary electronic mail server was shut down in Rocklin, California. The reason for the server shutdown was based on the determination that the cumulative service being provided by the division's automation system (known as the Reserve Component Automation System (RCAS)) was substandard. The decision was made to pull the plug on the e-mail life support system and shut down the server. Given this significant readiness impact, within days, the division's Chief of Staff directed the division's organic signal unit, the 240th Signal Battalion to develop and provide the division with a means to communicate electronically. Through state funding, the division procured the hardware, software, and connectivity necessary to establish itself as an Internet Service Provider (ISP).

Our mission, given to us by our sponsor, LTC Rod Barham, commander of the 240th Signal Battalion, was to develop an Intranet prototype which, first, because of the short time constraints, could be developed quickly and second, reflected the requirements and desires of the users to the extent possible, given the time constraints.

We met with our sponsor on 19 December, 1996 (Appendix A – TRIP REPORT 1) to further define the scope of our mission and to gather initial requirements. Following our initial development effort, we met with our customer to demonstrate our initial prototype efforts and to further define and refine user requirements (Appendix B – TRIP

REPORT 2). We delivered an operational prototype to our sponsor on 2 May, 1997 which, because of the need, was put on-line and made available to users that afternoon.

The goal of this thesis was to work with a military organization and focus on readiness improvement through the development of an Intranet prototype.

B. WHAT IS AN INTRANET?

An Intranet is a combination of a Local Area Network (LAN), Wide Area Network (WAN), and internet technologies (i.e., http and IP protocols, World Wide Web (WWW) browsers and servers, etc.) through which members of an organization, located anywhere in the world, can connect people and information electronically in order to more efficiently and effectively conduct business. The internal net or Intranet can be restricted to those authorized access by the organization.

C. CONTENTS

This thesis contains seven chapters and two appendixes.

1. Chapter I Introduction

This is the foundation chapter and gives a brief background followed by a thesis content section.

2. Chapter II Intranet

This chapter discusses the advantages of Intranet use followed by a discussion on the client/server model of computing. Hardware and software requirements for establishing an Intranet are also covered. The final section in Chapter II is a discussion about the information creation and consumption model.

3. Chapter III The Customer

Chapter III discusses the history, organization, structure, and mission of the 40th Infantry Division (Mechanized). The Reserve Component Automation System is the U.S. Army National Guard and Reserve office automation system. The RCAS system, which was fielded in its entirety in California (the first state to be fielded), went through a major program redevelopment following numerous cries of discontent from its user base. The fielding of the "old" RCAS system was halted while the program was reviewed and a "new" RCAS system emerged as a result. Federal funding for "new" RCAS components is expected in second quarter of FY98. The state and the division are working interim solutions (i.e., Intranet prototype) in order to provide the users with high quality electronic/digital service until the federal funding for the new system arrives.

4. Chapter IV The Prototyping Process

The methodology used for the development of the Intranet was the prototype model. This chapter initially contrasts the traditional waterfall model with the prototype model followed by a section discussing the benefits and drawbacks of using the prototype model. The scope of this thesis is also covered in this chapter. The Division's current information operations are discussed and, finally, the adaptation of the prototype model to the development of a military Intranet is covered.

5. Chapter V Identification of Basic Requirements

This chapter discusses the methodology used to gather requirements. Also presented is a discussion on the requirements gleaned from meetings with the sponsor. These requirements were used in developing the prototype.

6. Chapter VI The Prototype

This chapter covers the actual Intranet prototype. Numerous screen shots are provided to give the reader the "look and feel" of the developed prototype. The discussion of the prototype is related to the sponsor's requirements, which are presented in Chapter V.

7. Chapter VII Recommendations for Intranet Operation

It is imperative that the division establishes policy as soon as possible regarding the further development, implementation, and use of the Intranet. This chapter discusses Intranet policy and recommendations concerning policy areas which should be included in a division Intranet policy. This chapter also contains a section on Intranet lessons learned. These lessons learned are a compilation of ideas developed through the numerous readings done in this area. This section lists eight recommended steps the division should follow in order to insure success.

II. INTRANET

A. INTRODUCTION

Chapter I provided a definition of an Intranet. This chapter will present some of the advantages of Intranet use. This will be followed by a review of Intranet technologies. This includes a brief mention of the client/server model which is the heart of the web-based functionality of an Intranet. Hardware and software requirements for setting up an Intranet are also covered in this chapter. Finally, a section is presented on information creation and consumption.

B. ADVANTAGES OF INTRANET USE

A recent study by Network World found that eighty-nine percent of organizations sampled already have implemented or will implement an Intranet strategy in the next twelve months [1.2]. The large percentage of organizations that have implemented or planning to implement Intranets have been attracted by the numerous benefits provided by Intranets. Some of these benefits include:

1. Simplified Information Access

With the use of an organizational web server and a client web browser, an unlimited amount of static and dynamic information can be accessible to the user. Organizational policies, procedures, regulations, and databases are just a few examples of the types of information that can be accessed on an Intranet.

2. Enhancement of Communication and Collaboration

Information flow improves with the capabilities of conducting on-line collaboration through real-time "whiteboarding" and near real-time messaging through

electronic mail. Multipurpose Internet Mail Extensions (MIME) is a mechanism that allows users to attach application specific files to electronic mail which are then recovered on the receiving end for review, update, or further processing. Applications like Microsoft's Netmeeting allow users to conduct on-line chat room discussions and collective document preparation. Information dissemination is simplified for organizational command and control elements.

3. Productivity Enhancement

Combining the capabilities an Intranet set of tools provides postures an organization to become a more productive entity. Processing and accessing information by electronic means simplifies the communication process. Electronic mail allows users to respond on their time rather than having to respond on demand to an interruptive phone call. Collaborative tools allow groups who are geographically dispersed to brainstorm and come to consensus on team issues. Web pages allow department information providers the ability to quickly disseminate information. On the user side, the Intranet allows the user the flexibility to "pull" information, based on a need or desire to know. Examples such as these illustrate a work environment that allows individuals and teams to focus on their work tasks by providing a system that puts information literally at the fingertips of the organization.

4. Decision Support

One of the major strengths of an Intranet as a mechanism for decision support is that it facilitates access to distributed information and distributed access to desired information. This information can be in the form of data and models and can be obtained from different sources in a variety of formats and media, locally or remotely. The

Intranet provides a user-friendly mechanism for rapid access to information required for decision-making by facilitating the links between data, models and users. [2.2]

5. Affordability

One of the reasons Intranets are so appealing is the fact that web technology is inexpensive. The basic system configuration consists of a server hardware platform/operating system and WWW server software. On the user side, employees only need an inexpensive browser to navigate the information. A study conducted by U.S. Computer, and funded by Sun's Internet Commerce Group, indicates that web technologies can reduce internal corporate networking costs by as much as \$11 million over four years for a large network [2.3].

6. Ease-of-Use

Another major driving force behind the growth of Intranets is that the technology is intuitive and easy to use. Little training is needed before employees are "up and running" on the Intranet. Using their browsers, employees use hypertext links to search for and access text, graphics, audio, or video. At a very basic level, this means organizations can hold down printing and distribution costs for documents that are now produced on paper, such as organization policy letters and standing operating procedures.

C. INTRANET TECHNOLOGIES

1. The Client/Server Model

The WWW and Internet/Intranet technologies are based on the client/server model shown in Figure 2.1. To truly understand how an Intranet operates, it is important to understand the concept of client/server computing. The client/server model is a form

of distributed computing where one program (the client) communicates with another program (the server) for the purpose of exchanging information [2.4].

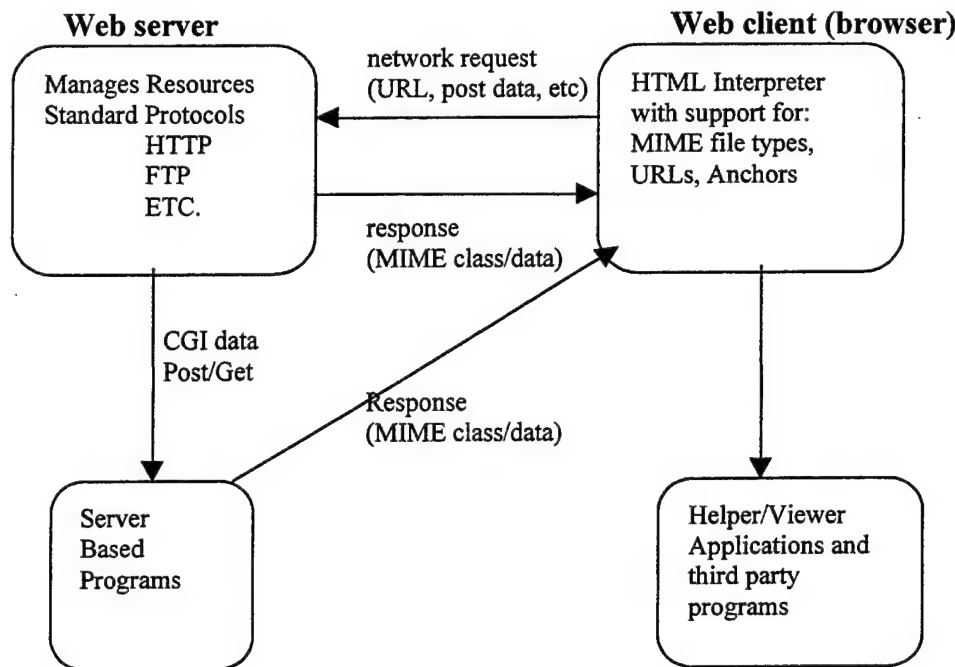


Figure 2.1. Client Server Dialog [2.5]

The WWW uses a distributed client/server architecture built around a message based on resource servers and client browsers as illustrated in Figure 2.1. Although it is, for the most part, transparent to the end users, browsing is a two-step process of downloading data from the server and then acting on it. This provides the opportunity to act on data with a browser or launch a new application for specific data types and, consequently, the behavior is easily extended.

Key WWW specifications include the Hypertext Markup Language (HTML), Uniform Resource Locators (URLs), Multipurpose Internet Mail Extension (MIME) and

the HyperText Transfer Protocol (HTTP) [2.6]. These specifications are discussed below:

- Hypertext Markup Language (HTML) – HTML is used when publishing a document that is to be displayed through the WWW. HTML is a set of simple syntax commands that describes how a document is structured. This language allows the user to define the parts of a document, but not the formatting, so that the browser used for reading the document can format it best to suit the user's display.
- Uniform Resource Locators (URLs) – a URL is a complete description of an item, containing the location of the item you want to retrieve. A typical URL looks like this: `http://jupiter.as.nps.navy.mil/40thdiv`. The first item in the URL (the portion that ends with a colon) is the protocol used to retrieve the item. For this URL the protocol is HyperText Transfer Protocol. The two forward slashes that follow indicate that what follows is a valid host address. It can either be the text as shown or the actual corresponding IP address of the site. `40thdiv`, in this case, is the default homepage for the web site titled 40thdiv.
- Multipurpose Internet Mail Extension (MIME) – MIME is an extension to the existing Simple Mail Transport Protocol (SMTP) standards that offer a standardized way to represent and encode a wide variety of media types, including textual data in non-ASCII character sets, for transmission via internet mail [2.7].
- HyperText Transfer Protocol (HTTP) – After it was decided to use hypertext as the standard format for WWW documents, a protocol that allowed these hypertext documents to be retrieved quickly was developed. This protocol is HTTP. HTTP is a simple communication protocol that allows the document it is retrieving to retain hyperlinks to other documents during download.

Using Figures 2.1 and 2.2, a scenario can be presented to illustrate a typical process in an Intranet environment: user with access to the local area network via a direct connection or a dial-in capability has a web browser residing on his/her client machine.

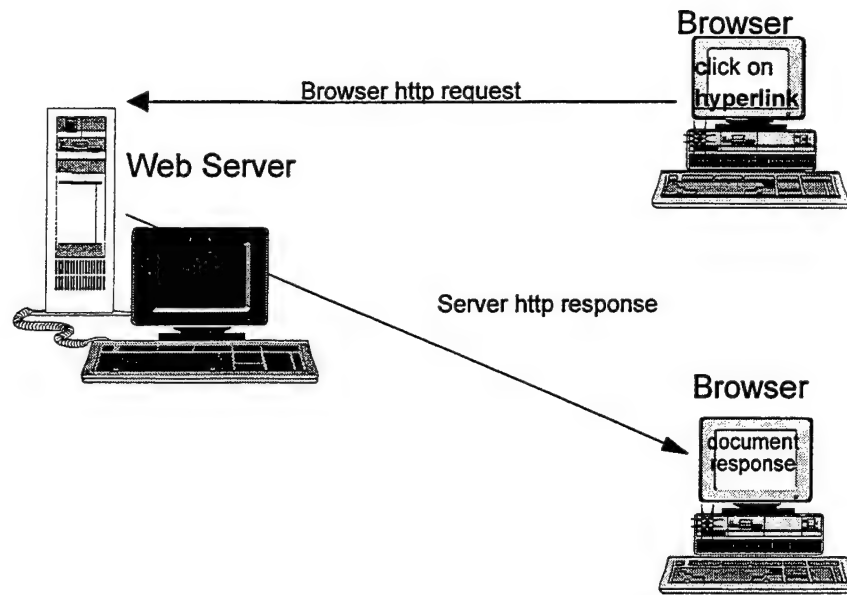


Figure 2.2. Browser/Server Communication [2.8]

The browser reads a document written in HTML and displays it for the user, interpreting all the markup codes. When the user clicks on a hyperlink in an HTML document, the browser uses the HyperText Transfer Protocol (HTTP) to send a network request to a web server to access the new document or service specified by the hyperlink (i.e., service using server based programs). The client's request is handled in one of two ways. If the request is for a document or data, the response involves the delivery of the document or data to the client browser.

A second situation is if the user is requesting some type of service from the server (i.e., post data to a database, query database, server side processing, etc.). In order to access server programs and invoke them from a web client, the server uses a Common Gateway Interface. The function of the CGI is to interpret service requests from the server to server based programs. The Open DataBase Connectivity standard is a form of

CGI developed by Microsoft to allow browsers and servers the ability to interact remotely with server based database programs. Once the server services a request-based program, a response is sent back to the user's browser (i.e., query results). When the response comes back to the user's browser, the HTML interpreter displays the requested document. The displayed document contains hyperlinks with underlying URL locations for other web server based documents and data.

Browsers can be configured to launch executable files the moment a server response is received. For instance, a request is made for an administrative form that resides on the server. The moment the file is returned to the browser, the browser invokes the executable command for the application residing on the client's machine (i.e., administrative form preparation program) and launches the application. After completing the form, the user can immediately launch a mailer (both Internet Explorer and Netscape have mail clients that reside in the browser environment), attach the form as a MIME and send it to other Intranet users for action or additional processing.

D. HARDWARE AND SOFTWARE REQUIREMENTS

An Intranet can be tailored to the organization's information requirements. The heart of an Intranet is the host or server. As mentioned previously, members of the organization will have access to the Intranet through the Local Area Network (LAN) or through other means such as dial-in access via a modem.

Requirements:

- server computer on LAN with appropriate web server software such as Microsoft's Internet Information Server (IIS). Once the scope of the Intranet is defined, the server computer should have sufficient CPU, RAM, and Disk Storage resources to handle the expected load of "requests" from numerous client browsers accessing the server simultaneously.

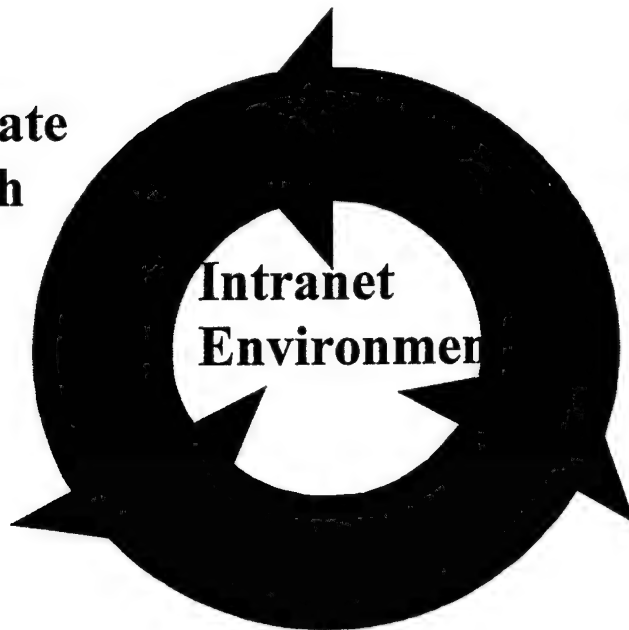
- authoring software such as Microsoft Frontpage to create and update site content
- browsing (client) software such as Netscape Navigator and Microsoft's Internet Explorer for all users
- other server software, such as mail server software, which will permit the use of electronic mail across the network

E. INFORMATION CREATION AND CONSUMPTION

The previous section implies that, from a purely hardware and software perspective, putting together an operational Intranet is not a difficult task. The difficulty resides in administering the Intranet so that it provides relevant, up to date and useful information to users. Chapter VIII covers Intranet operations and looks specifically at recommendations for Intranet and content control. Ultimately there will be a need to decentralize the process of Intranet control (i.e., Divisions delegate brigade web management to brigades, brigades to battalions, etc.) This, of course, only occurs after adequate training in web publication, content standards, etc. Figure 2.3 presents an information development and consumption cycle [2.9] that is prevalent in an Intranet environment. This model assumes a decentralized posture within the organization.

**Collaborate
& Publish**

**Gather
Content**



Analyze & Create

Figure 2.3. Information Production and Consumption Cycle [2.9]

A typical member of an organization operates in the context of an information creation and consumption process. His/her primary product is new information in the form of memorandums, budgets, proposals, analysis, presentations, work requests/orders, etc. Each of these “raw” forms of information requires some action on the part of the information recipient. This action may be some combination of content creation, analysis, data access, collaboration, and publishing [2.9], which contributes to the overall knowledge base of the organization.

The first step in this iterative process is to gather content worthy of further analysis and, ultimately, to publish it on the organization’s Intranet. An individual identified to be the responsible person (held accountable for web-publishing and content) for each entity (i.e., division webmaster, brigade webmaster, etc.) will gather information

from many sources. As information is collected and analyzed, the webmaster begins to create new content using familiar publishing tools like Microsoft's FrontPage. In some situations, content creation will be a collaborative effort, where team members work together to come up with content. Once the content is published, the information is made available to others on the Intranet, which drives them into the creation and consumption cycle.

The tasks within the creation and consumption model can be further broken down and discussed:

1. Content creation

Some documents, by their nature, require frequent revisions, where others will only have to be updated periodically. Examples of documents which will require frequent updating include: training schedules, commander's guidance, staff notes, operation orders, intelligence summaries, etc. Documents which will only be updated periodically include: policy letters, standing operating procedures (SOPs), soldier packing lists, inspection checklists, etc. The dynamic characteristics of any organization cause constant change in current information. In order to maintain relevant, meaningful, and up-to-date information, the webmaster at each entity level has to keep a pulse on what information is being provided to its subscribers. With the need to change content often, it is imperative that the webmaster be provided with the friendliest publishing tools available.

2. Analysis and Data Access

Office application suites today allow the user to save text documents, spreadsheets, and presentations in HTML format. Databases can be tied to web servers

via common gateways such as Microsoft's Open Database Connectivity Standard (ODBC). These functions allow Intranet users to easily access and analyze budgets, proposals, presentations, etc. The ability to access database records gives authorized users the capability to remotely update those records and conduct analysis on existing records through queries. The ability to access pertinent information quickly allows the user to conduct analysis more quickly and thoroughly. Providing immediate access to relevant documents drastically reduces the user's decision cycle.

3. Collaboration

Organizational documents often have many authors who work together in order to produce a collective product. The Intranet environment allows users to review, comment on, and update working documents before final versions are published.

4. Publishing

One of the greatest benefits of having an Intranet is the ability to quickly disseminate information. Once created, there is an enormous amount of information that needs to be shared widely within an organization, such as operations orders, policies, procedures, scheduling, and budgeting information. Current application publishing tools make converting this kind of information into HTML documents and posting them on an Intranet a very simple process.

F. CONCLUSION

This chapter has covered a broad range of Intranet related topics including the benefits provided by an Intranet, the client/server Intranet architecture, hardware and software requirements necessary to implement the Intranet and, finally, a view of how an

organization develops and consumes information. The following chapter focuses on the customer, the 40th Infantry Division (Mechanized).

III. THE CUSTOMER

A. INTRODUCTION

As mentioned previously, a large part of the motivation for this research was to develop a product that would improve the readiness of a military organization. Also mentioned earlier was the fact that a search for a military customer was conducted immediately. The search included those organizations that had an existing technical architecture, which could support the implementation of an Intranet.

This chapter focuses on the customer, the 40th Infantry Division (Mechanized) of the California National Guard. A brief history of the Division is provided, followed by a look at the Division's organization, structure and mission. The Reserve Component Automation System (RCAS) is the administrative system for Army National Guard and Reserve. It is a Wide Area Network (WAN) that is a worldwide system proposed to provide interconnectivity for all guard and reserve units. RCAS is a multi-billion dollar information systems acquisition program, which, until fielded in California, leaves a void in the Division's ability to conduct digital information sharing. In this chapter, the RCAS program is addressed first followed by a discussion of the 40th Division's problem of degraded information operations. Finally, a discussion the proposed solution, of which the development of a division Intranet is a major part.

B. BACKGROUND

1. History

The 40th Division was organized at Camp Kearney, near San Diego, California, on 25 August 1917, and was composed of National Guard organizations of the states of Arizona, California, Colorado, Nevada, New Mexico, and Utah.

The division fought with distinction in World War I, World War II, and the Korean War. The Division has four recipients of The Medal of Honor, which is our country's highest award for bravery. In addition to the division's gallant federal service, the "Citizen-Soldiers" of the 40th Infantry Division have responded to countless state emergencies, providing service to the state of California. Some of the state emergencies where the Division distinguished itself include the Folsom Prison riots (November, 1927), Long Beach earthquake (March, 1933), Sacramento floods (December, 1950), "Watts Riot" (August, 1965), Los Angeles Civil Disturbance (1992) and the Northridge Earthquake (January, 1994).

2. Organization

The 40th Infantry (Sunburst) Division is headquartered at Los Alamitos, California. Figure 3.1 is a hierarchical depiction of the 40th's organization. The Division follows what is known as the active Army's J-series Table of Organizational Equipment (TOE). A TOE gives like units the same authorization for personnel and equipment. The division is depicted at the top with an XX (indicates a division size element) symbol above the symbol for a mechanized infantry unit. The division consists of three maneuver brigades (each with three battalion size elements), an aviation brigade (consisting of four aviation battalions and one air cavalry squadron), an artillery brigade (with three battalion and two company sized elements), an engineer brigade (consisting of three battalions), and a division support brigade (with one main support battalion and

three forward support battalions). Also organic to the division are an air defense battalion, a signal battalion, a military intelligence battalion, a Military Police (MP) battalion, a chemical battalion, a long range surveillance battalion, a band, and light infantry (1-184).

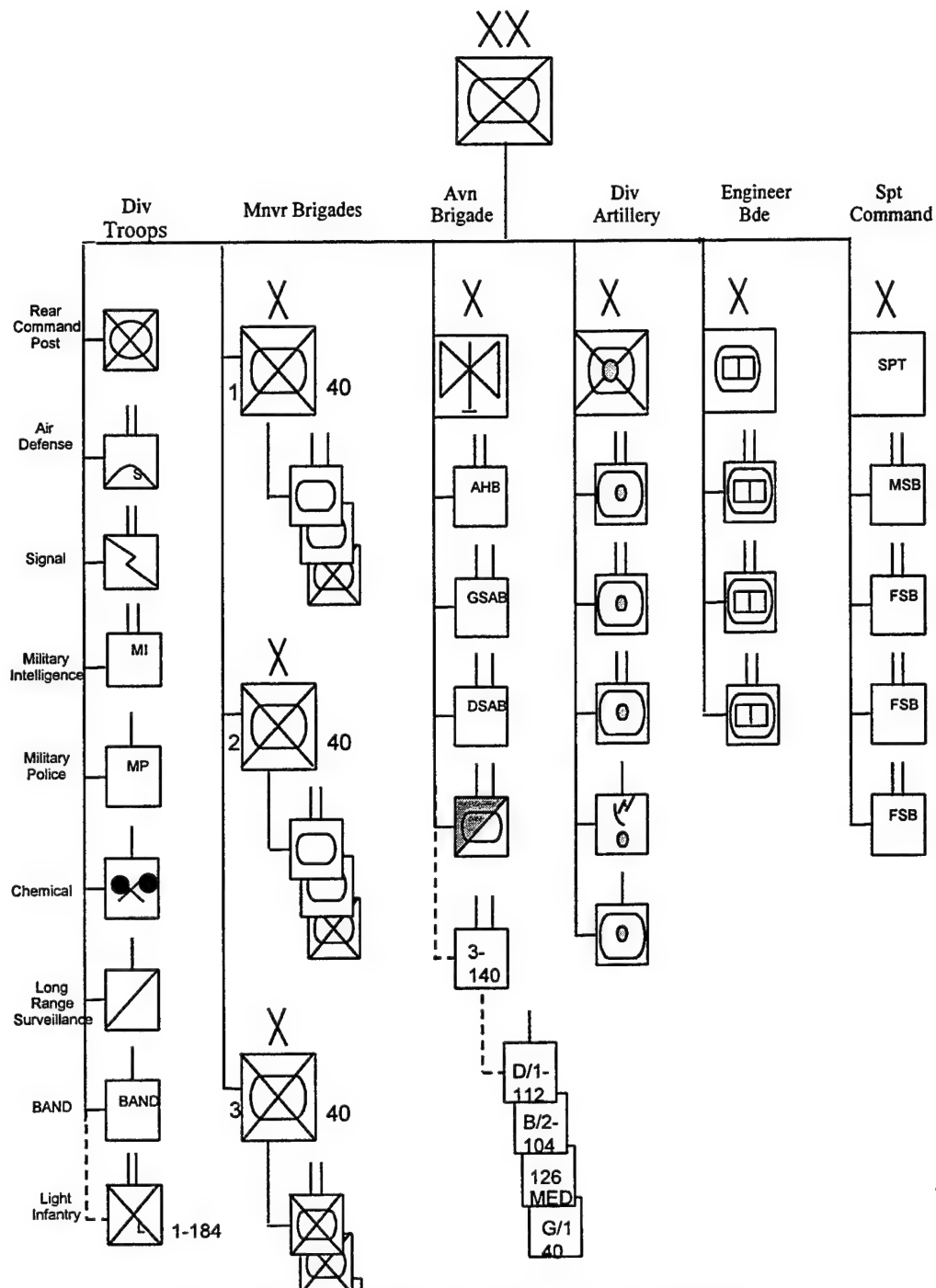


Figure 3.1. The 40th Division Organization [3.1]

company, a chemical company, a long-range surveillance company, and the division band.

3. Structure

Like most military organizations, the mechanized infantry division is hierarchically structured. Each battalion through division size element (entity) has a staff of primary officers who assist the commander in planning, coordinating, preparing, and executing operations within and outside the division. Literally thousands of processes (both formal and informal) are executed by division entities on a daily basis. In order to control the different processes, battalion through division size organizations break down these operations into four primary task groups. A responsible officer is chosen by the commander to lead these operational groups at each entity level. These groups are labeled staff elements and are numbered one through four with five (civil affairs) and six (communications and computers) located at division level and above units. Figure 3.2 depicts the hierarchical structure of a typical staff. The Chief of Staff (division level and above) or Executive Officer (XO) (brigade level and below) presides over the staff at each entity level down to and including battalions. There are a total of seven brigades

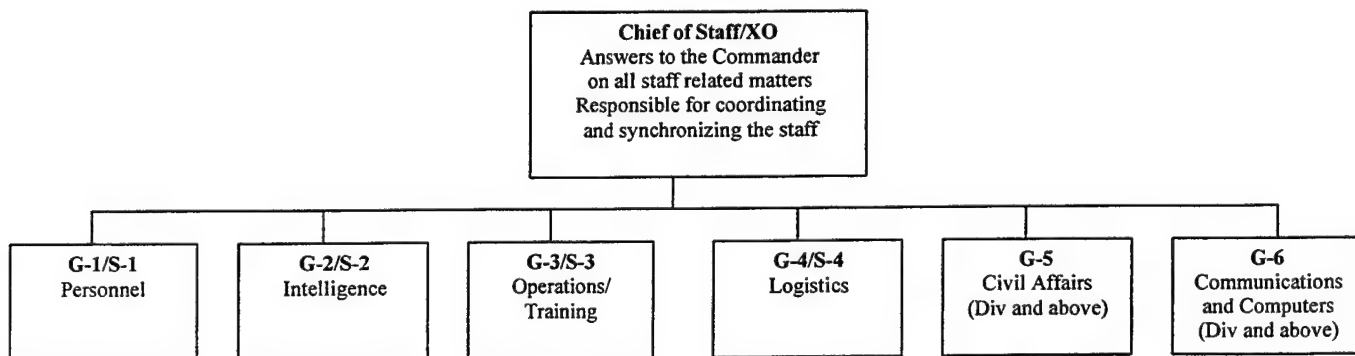


Figure 3.2. An Army Staff

and twenty-three battalions in the 40th division. Each of them possesses a staff similar to the one depicted in Figure 3.2.

Below is a very brief description of each staff element's area of responsibility.

The intent is to give the non-military reader an introduction to military staff areas of responsibility.

- **G-1/S-1(Personnel):** Responsible for all personnel actions in the division, to include awards, promotions, pay inquiries, and personnel replenishment planning in a combat environment. If it has to do with personnel actions, it is the G-1/S-1's area of responsibility.
- **G-2/S-2(Intelligence):** The intelligence section of an organization focuses on the threat. The threat may be local gangs that present a potential threat to a military installation or an enemy combat foe with armored tanks and artillery pieces. The G-2 is responsible for keeping the commander and the rest of the staff abreast of the capabilities and limitations of the threat and what the threat is doing. In a garrison environment, the G-2/S-2 is responsible for security awareness and measures to combat the threat in that environment.
- **G-3/S-3(OPS/Training):** The G-3 is the operations and training officer. Planning, preparing for, and executing training events is one of the G-3/S-3s many responsibilities. The OPS/training officer's focus during peacetime is on the unit's Mission Essential Task List (METL). A unit's METL are those tasks it must be able to perform in order to insure a combat level of readiness. The G-3/S-3 writes the operations orders (OPORDS), issues fragmentary orders (updates to OPORDS) and coordinates the other staff's activities in the absence of the Chief of Staff.
- **G-4/S-4 (Logistics):** The logistics officer is responsible for all logistical matters in the division. The G-4 arms, fixes, fuels, feeds, houses, and transports the division. Like the other staff elements, the G-4 is heavily involved in planning operations. In order for the G-3 to consider an operationally feasible plan, the G-4 must certify that the plan is logistically supportable.

The 40th has subordinate organizations in five different states (Arizona, California, Montana, Utah, and North Dakota). The 40th division accounts for nearly eighty percent

of the National Guard soldiers in the California. Figure 3.3 provides major command locations of the Division's major commands throughout California.

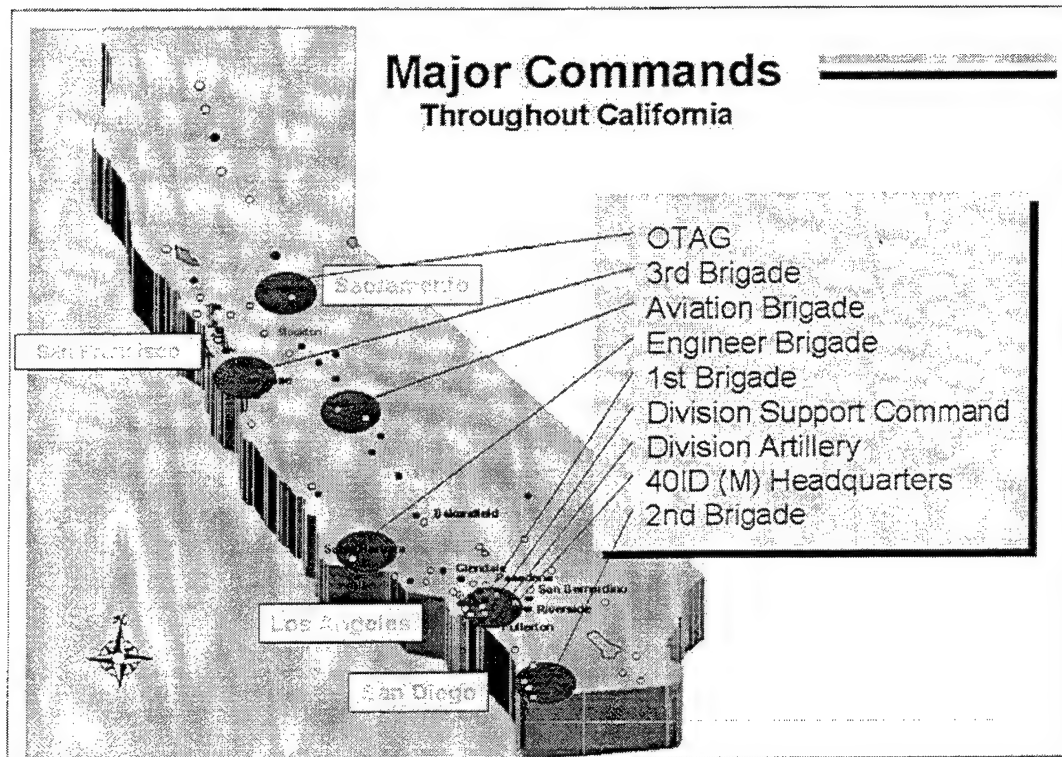


Figure 3.3. 40th Division Units in California [3.2]

4. Mission

The 40th Division has a dual mission. Their federal mission is to provide combat ready forces to the Department of Defense. In order to do this, the division conducts pre-mobilization training to maintain a level of readiness so, when called upon to mobilize, she can do so on short notice. Once mobilized, the division must conduct the necessary post mobilization training to further prepare itself to deploy, fight, and win.

The division's other mission is to provide military support to civil authorities. The division answers to the Office of The Adjutant General (OTAG) and to the state's

Governor. Both are located at the state's capitol in Sacramento. The state of California is the most disaster-prone state in the nation. The division's mission summary list for 1996 include 600 counter-drug, 33 emergency shelter, 21 fire, 11 search and rescue, 3 flood, and 16 other support type missions [3.3].

C. RESERVE COMPONENT AUTOMATION SYSTEM

1. Background

The Reserve Component Automation System (RCAS) is an Army National Guard and Reserve component sustaining base/office automation system. The system was designed to meet the day-to-day office automation requirements to the Army's reserve component. The design of the system significantly enhances the reserve component's mobilization preparedness and execution.

In February 1995, amidst reports indicating program problems (i.e., cost and schedule overruns, system performance problems, customer dissatisfaction), Lieutenant General Edward D. Baca, Chief of the National Guard Bureau, assembled a "Red Team" to conduct an objective assessment of the program status of the RCAS. The team was chartered to identify problem areas and to develop courses of action necessary to put the program back on a reasonable development and implementation path. The "Red Team" recommended significant changes in the RCAS program in many program areas [3.4]. Following the recommendations, the RCAS Validation Assessment Team (VAT) was established to validate and substantiate the Red Team's findings. The charter of the VAT was to identify, assess, and develop a complete system solution which was consistent with the Red team's recommendations and satisfied user-defined requirements of the United States Army Reserve Component, within budget. [3.5]

In order to give the reader a perspective of where the program was when General Baca called for the assessment, the following bullets are provided which characterize the program at that point in time:

- Fielding of the original system began in 1987. Nearly thirty percent of the projected 4000 plus sites had been fielded when deployment of the system was halted in 1995. California was the first state fielded. A total of 387 units and activities were fielded with the original RCAS in California.
- Difficulties in managing the users and their needs and expectations led to changes in the requirements, which ultimately impacted software design goals and objectives. This resulted in a projected two year delay in the completion of the first block of software.
- The original architecture is a Unix based client/server environment. The system called for x-terminal client machines with no local capability (i.e., resident CPU) for application processing. There were complaints about the user's familiarity with Unix based applications and the Unix command line, particularly for soldiers who only drill one weekend a month.
- The system was used primarily as an e-mail system. There were 5 regional mail hubs, which routed mail traffic down to the unit level. Each unit maintained its own dedicated Unix based server. The original solution required units to dial-in to one of the five regional mail hubs in order to upload and download mail. The original architecture using these dedicated Unix servers with little or no redundancy at some sites was very susceptible to single point failures.
- The original system architecture called for a distributed database with data servers physically located at the unit or end user level. The initial plan called for the procurement and implementation of the anticipated 4,700 locations with costly specialized hardware and software. An illustration of the original architecture is presented in Figure 3.4.

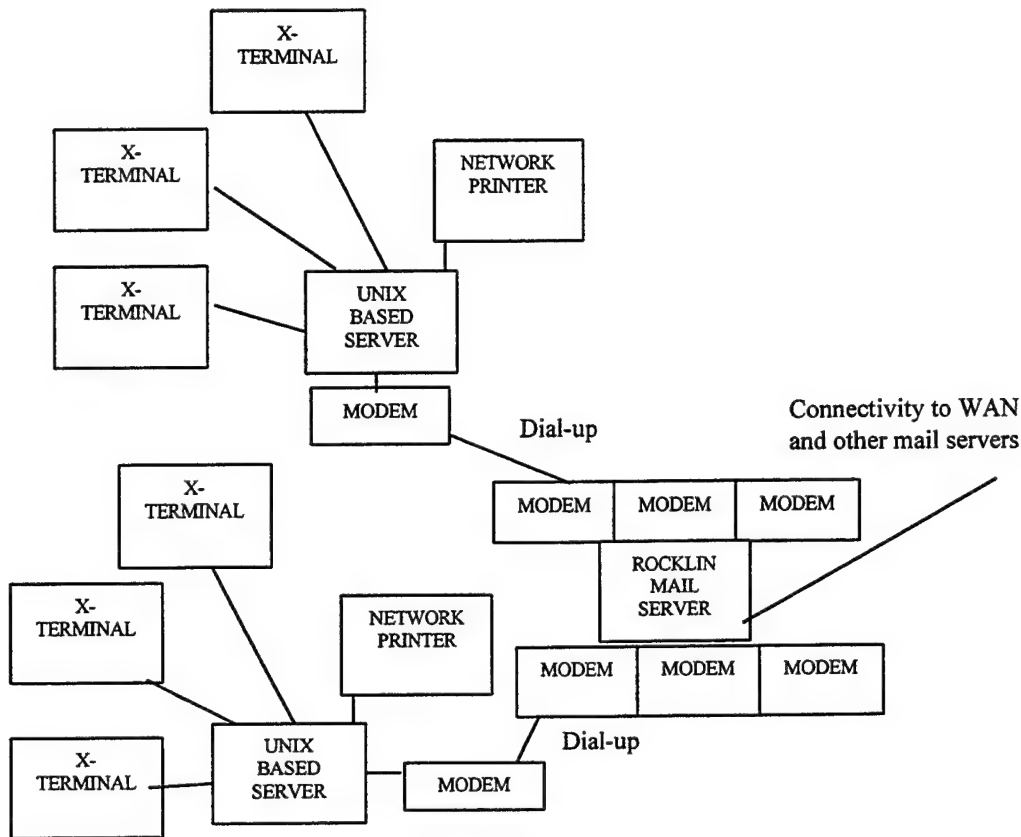


Figure 3.4. RCAS Original Architecture

At the time the “Red Team” was formed, the RCAS program was suffering from not being in tune with the requirements and needs of the customer.

2. Scope

The Reserve Component Automation System is a 2.5 billion-dollar program. Rather than dwell on the problems the program has suffered in the past, a chose was made to look to the program's future and the recommendations made by the Red team and the VAT. On 19 July, 1995, the RCAS General Officer Steering Committee (GOSC), the overall decision-making body for the RCAS, directed the RCAS Program Management Office (PMO) to implement the Red Team/VAT recommendations [3.6].

The major restructuring of the RCAS program in 1995, based on the assessment team's recommendations caused significant changes in the way the program was being run. The focus of the remainder of the discussion on the RCAS system centers on the following areas: Red Team/VAT recommendations in the areas of system architecture, system data and applications, and system deployment.

3. System Architecture [3.7]

The Red Team/VAT established objectives before they considered different architectural and design alternatives for the new system. Those objectives included:

- Use of Industry/ DOD standards
- Maximum use of Commercial Off The Shelf (COTS) and Government Off The Shelf (GOTS) hardware and software
- Meet the needs of the users
- Use mainstream technology
- Use scalable components with scalable architecture
- Make architecture adaptable to rapidly changing technology
- Ensure compliance with the Army's Technical Architecture (ATA) and Defense Information Infrastructure's Common Operating Environment (COE)
- Make the architecture data-centered

The resultant architecture recommended by the VAT and approved by the RCAS General Officer Steering Committee (GOSC) is in-line with the objectives established prior to architecture formulations. The architecture can be characterized as a server/workstation architecture and is presented in a very broad view in Figure 3.5.

Scalability is probably the first noticeable characteristic in Figure 3.5. Because of the different sized organizations, the sites are configurable to suit the needs of the user.

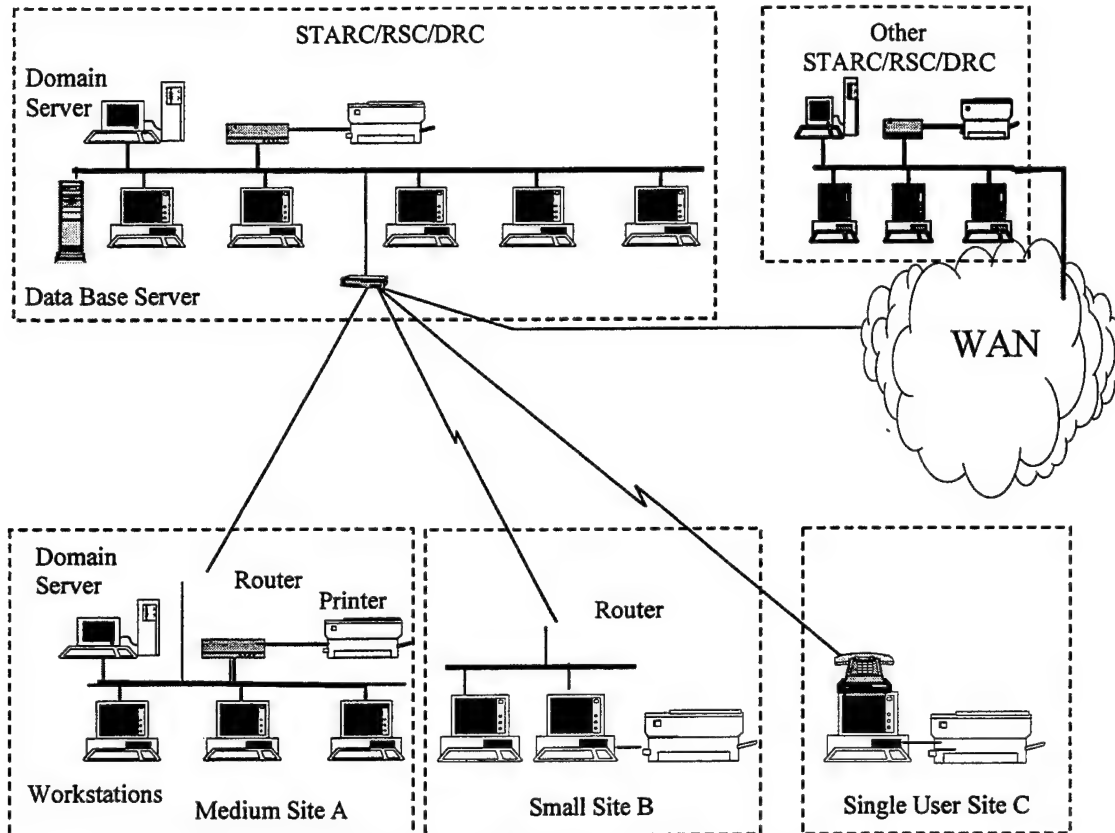


Figure 3.5. RCAS Server/Workstation Environment [3.8]

Most State Area Command (STARC), Regional Support Command (RSC), and Direct Reporting Commands (DRC) are considered large sites (76+ workstations). These major hubs provide the WAN connectivity to other STARCs, RSCs, and DRCs. Other configurable variants include medium sites (17-75 workstations), medium sites (9-16 workstations), and small sites (1-8 workstations).

The server side of the server/workstation architecture is based on Microsoft's Windows NT Server 4.0, which is a network operating system. The NT Servers which are located throughout the architecture provide such system functions as centralized administration and management, e-mail, LAN printing, file sharing, configuration management, virus protection management, and system and file security [3.9].

The implementation of any Windows NT server design is based on a domain structure. A domain is a set of servers, defined as a logical group, which holds the user account/domain database. A domain is the basic unit of centralized administration and security. NT server provides the connectivity, reliability and availability, base system services and administrative tools necessary to deliver critical information across a large distributed network of computers. [3.10]

All workstations in the workstation/server environment are based on Personal Computer (PC) architecture with a Pentium processor, 16MB RAM, an IDE Enhanced controller, and a 1 GB hard disk. The workstation operating system is Microsoft Windows NT workstation. NT workstation provides security at the C2 level which includes Identification and Authentication (I&A), Discretionary Access Controls (DAC), Audit and Object Reuse. This provides users with the capability to restrict access to data on a read/write basis and administrators with the ability to monitor system usage. The Office Automation (OA) suite (Microsoft Office) has the friendly graphical user interface (GUI) that users are familiar with. All the application files in the OA suite can be attached to a mail message using Multi-purpose Internet Mail Extension (MIME) (Chapter 2) and sent using the resident mail client. A closer look at the architecture indicates the RCAS will operate as two separate systems, one for classified or "Red" processing and one for unclassified or "Black" processing. Figure 3.6 shows the Red system solution.

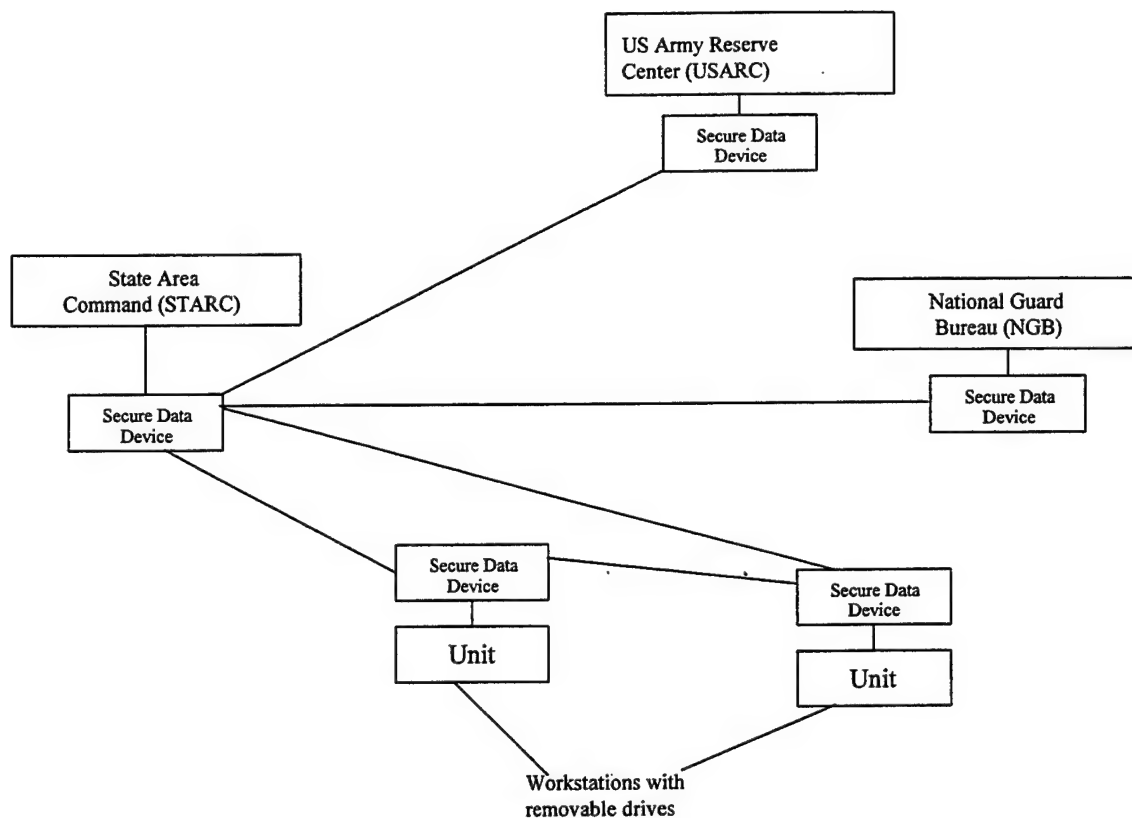


Figure 3.6. RCAS Red Architecture Solution

The “Red System” is characterized by its use of secure data devices (i.e., STU-III) operating at each entity level between transmitting and receiving units. The architecture calls for stand-alone workstations at all echelons with removable media (i.e., hard disks).

The “Black System” solution side of the RCAS system is depicted in Figure 3.7. The NIPRNET is DOD’s unclassified but sensitive Internet Protocol Router Network and serves as the network backbone for RCAS. The RCAS is vulnerable in two areas. First, the network has no means to safeguard the integrity of traffic and protect it from disclosure. The second is that RCAS nodes connected to the NIPRNET are vulnerable to attack from the Internet.

In order to protect the integrity of traffic, the architecture calls for the use of Digital Encryption Standard (DES) packet encryptors. Every workstation will be equipped with PC card slots. The DES packet encryption devices are credit card size and uniquely identify message traffic senders and receivers. The cards are inserted into the card slots in order to encrypt and decrypt messages. A COTS firewall at the RCAS Network hub will provide managed access to the RCAS system from the internet.

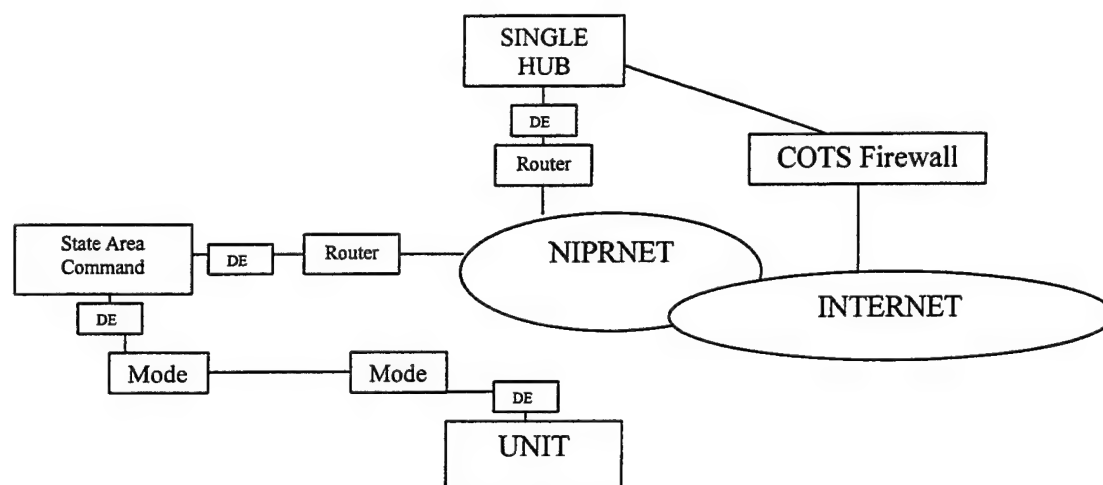


Figure 3.7. RCAS Black Solution Architecture [3.12]

4. System Data and Applications

If you recall, one of the objectives of the VAT, when considering the RCAS, was to make the architecture data centered. The power and utility provided a user, when able to query database management systems, can not be underestimated. The ability to access local or remote databases provides the user with a powerful decision support tool. Figure 3.8 provides an illustration of how the “data centered” components will be incorporated in the RCAS architecture.

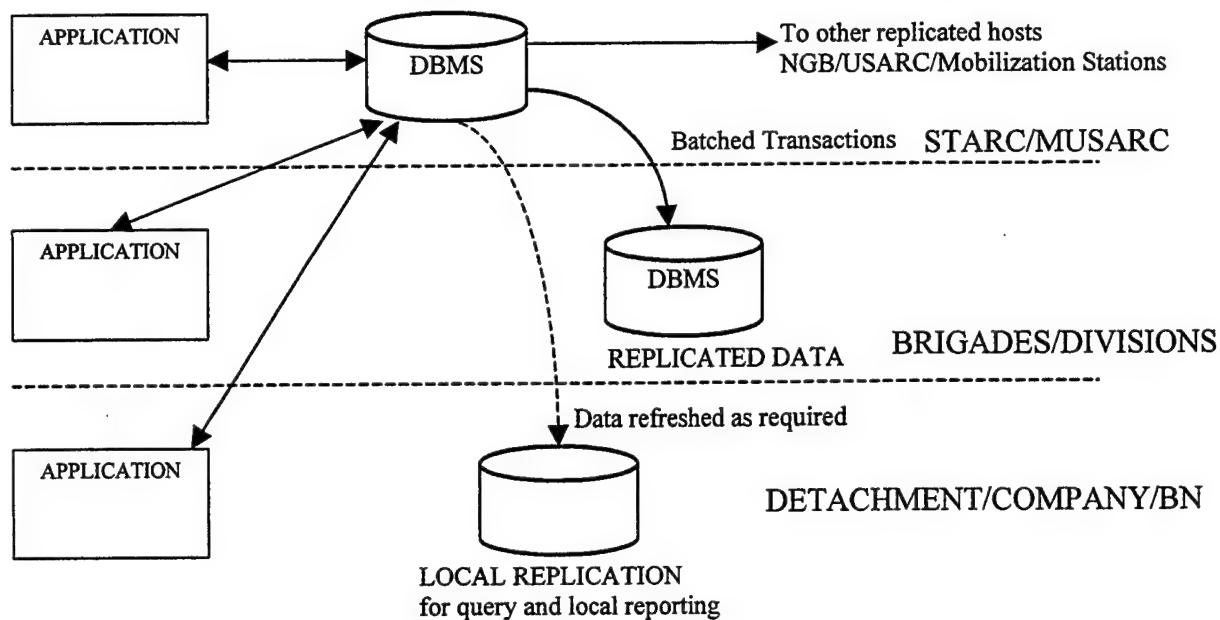


Figure 3.8. RCAS Database Architecture [3.13]

A DataBase Management System (DBMS) is established at State Area Commands (STARC) and Major United States Army Reserve Commands (MUSARC). The DBMS at this level will also be known as the DataBase Of Record (DBOR). These DBORs will be tied to other replicated hosts including hosts at the National Guard Bureau (NGB), the United States Army Reserve Command (USARC) and Mobilization stations throughout the guard and reserves. Applications residing on local level machines will allow the local user to access and query the DBOR. Batched transactions will allow the DBOR to update the DBMS at the intermediate (Brigades and Divisions) and lowest levels, to provide the user with an up-to-date replication of the DBOR. This provides the user with a local query and reporting capability.

5. RCAS Deployment

Deployment of the system is defined as those functions necessary to manage and distribute RCAS automated data processing (ADP) hardware, telecommunications equipment, and the office automation or pre-loaded software to the designated (4,000 plus) end user sites or locations [3.13] Figure 3.9 gives the locations of the approximately 4021 RCAS sites, which include 10540 units. Figure 3.10 gives echelon unit quantities by site size and totals the number of sites, units, and workstations.

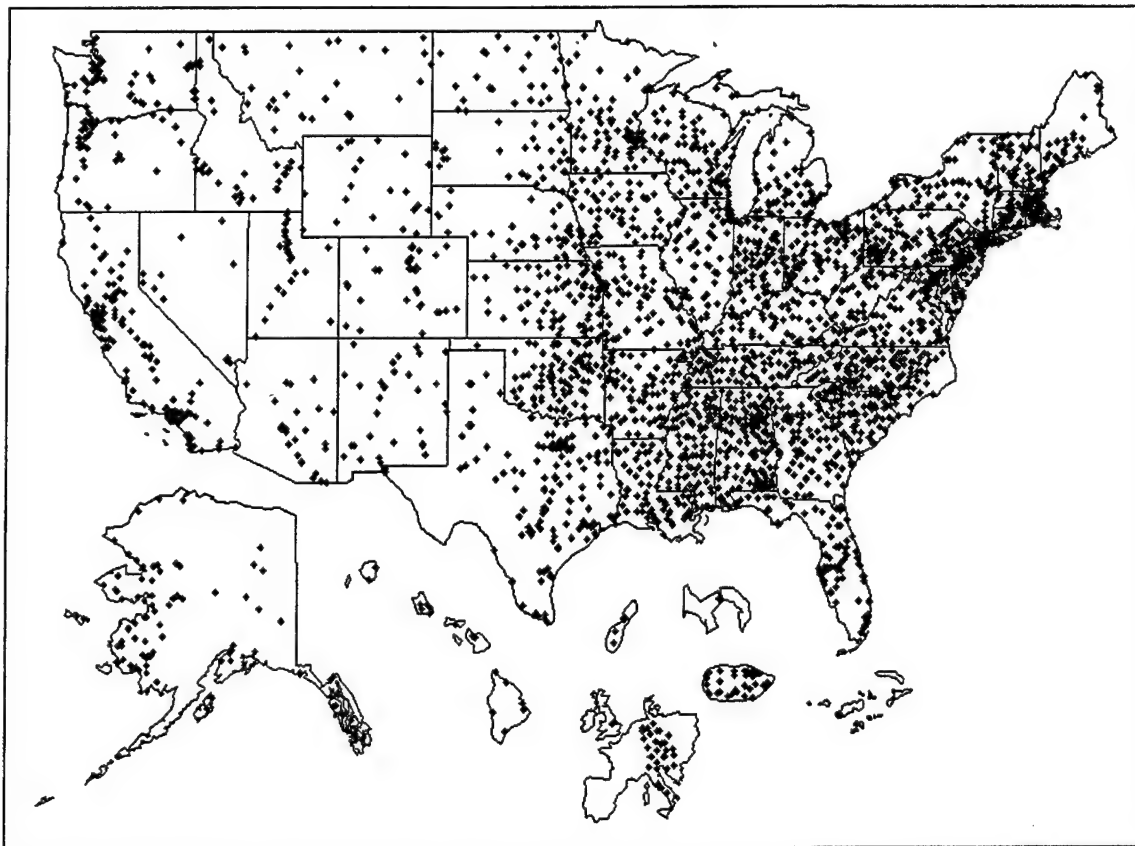


Figure 3.9. RCAS Deployment Site Location [3.14]

ECHELON UNIT QUANTITIES BY SITE SIZE					
	2,648 SMALL SITES (1-8 workstations)	614 MEDIUM SITES (9-16 workstations)	645 MEDIUM SITES (17-75 workstations)	114 LARGE SITES (76+ workstations)	
Echelon Type					Totals
CO & BN	2829 units	1631 units	3087 units	1023 units	8,570
AASF	3	27	67	17	114
ES/MS	388	214	292	109	1,003
SCHOOL	40	29	79	45	193
BDE HQ		30	146	43	219
DIV HQ	3	7	133	50	193
RSC/DRC			3	34	37
STARC			7	53	60
USPFO			18	34	52
OTHER	14	8	44	33	99
Total Sites:	2,648	614	645	114	4021
Total Units:	3,277	1,946	3,876	1,441	10540
Total Workstations	10,099	7,837	19,385	18,873	56194

SOURCE: AFR 6/15/95 & IP 1/95

Figure 3.10. RCAS Unit Distribution [3.15]

D. CURRENT STATUS

The intent of this section is to give the reader a current status of the “post-old RCAS” and “pre-new RCAS” situation in the state of California. As was mentioned previously, California was the first state in the U.S. fielded with the old RCAS system. The fielding of 387 Unix based servers with ancillary equipment (i.e., x-terminals,

printers, etc.) to as many units and activities, was done at an estimated cost of nearly \$100 million. The state's number one priority for fielding the old RCAS system earned it a very low priority (last state to be fielded) for federal funding of the new system.

Information management representatives from the state headquarters do not expect program funding for equipment, installation, fielding, and training until 2nd Quarter of fiscal year 1998. The 387 units and activities throughout the state were totally reliant on the server-based office applications when the decisions were made in 1995 to shift to a PC based workstation/ NT server environment. Very few of the organizations had PCs to conduct office administration tasks. The ability to share data electronically with adjacent units, via a network, was eliminated when the Rocklin regional mail hub was shut down in October, 1996. Since then, the state and the division have aggressively pursued information operations initiatives with state funding to improve their ability to pass information in a quick and efficient manner. The state's initiatives are in-line with the architectural requirements for new RCAS system. (i.e., MS NT based, MS Office, etc.) The state is posturing itself for new RCAS using state funding to come up with interim solutions to their degraded information operations. Some of the initiatives that have been enacted include:

- The purchase and issue of two (in some cases only one) or more PC workstations to each of the 387 units and activities throughout the state
- The development of a web-based Division Intranet (this thesis) which has since been expanded into a State-wide Intranet called the "Grizzly Net"
- The establishment of a Primary Domain Controller (PDC) at the state headquarters which will be the PDC for the state's Wide Area Network (WAN)

- The establishment of six Back-up Domain Controllers (BDC), one each at the following locations: San Francisco, Stockton, San Luis Obispo, Los Angeles, and Sacramento. Each of these BDC sites will have a dedicated T-1 connection with the PDC in Sacramento. Each of the BDC sites is being equipped with a modem bank to allow units without a dedicated line connectivity to the network.
- The establishment of 11 subnets (organizations with 17-99 workstations) off the states WAN
- The development of a tactical network

These are just some of the many initiatives ongoing in the California National Guard to improve the current state of information operations and to posture itself for program funding and fielding of the RCAS system in 2nd Quarter of FY98.

IV. THE PROTOTYPING PROCESS

A. INTRODUCTION

To better understand the potential contribution the prototyping process can have on development of a prototype, there must first be a definition of what the process entails. Next, a review of the project scope and the current operating environment will set the stage for determining how best to modify the prototype process to meet the division's needs.

B. THE PROTOTYPE DEVELOPMENT MODEL

A prototype is defined as a preliminary working version of an information system for demonstration and evaluation purposes. It follows that prototyping may be defined as the process of building an experimental system quickly and inexpensively for demonstration and evaluation so that users can better determine information requirements [4.1]. The primary purpose of the prototyping process is "to reduce time and expense in building quality systems" and "mandates a philosophy of incremental system development that includes end users in the assessment of emerging system capabilities" [4.2]. Understanding this process and its potential benefits and pitfalls can best be accomplished after a review of the traditional waterfall development model.

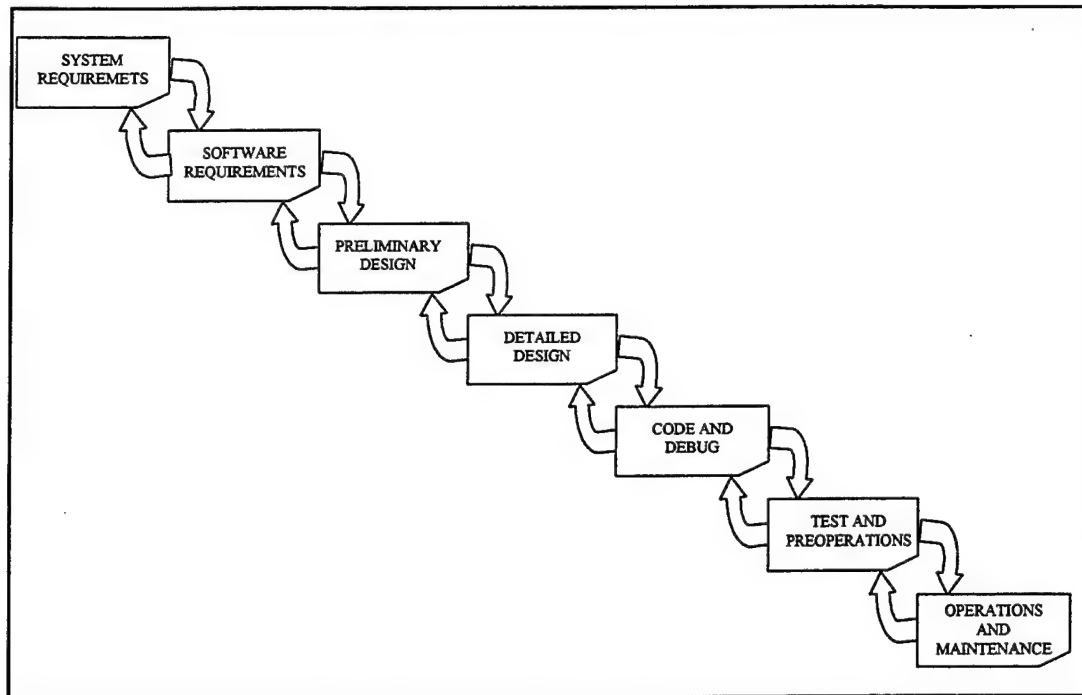


Figure 4.1. The Waterfall Model [4.3]

Figure 4.1 displays the typical steps in the waterfall model. This display shows seven steps required in developing a business application, with each step being iterative with the step before it. This is to say that the product is verified as it moves from one phase to another, and validated/corrected after arrival at each new phase [4.3].

Because the waterfall model has been in widespread use since the 1970's, its advantages and disadvantages have been widely documented. The model is well known for bringing much needed organization to very large projects. The rigorous execution of each phase coupled with the validation and verification processes often leads to monumental management effort, high costs, project delays, high maintenance costs, obsolete products and, worst of all, products which no longer address the central needs of the customer [4.1, 4.3].

By comparison, the basic prototype model presented in Figure 4.2 is designed to include user feedback early in the development cycle. The first step places emphasis on capturing the most basic of customer requirements to be used in developing the initial

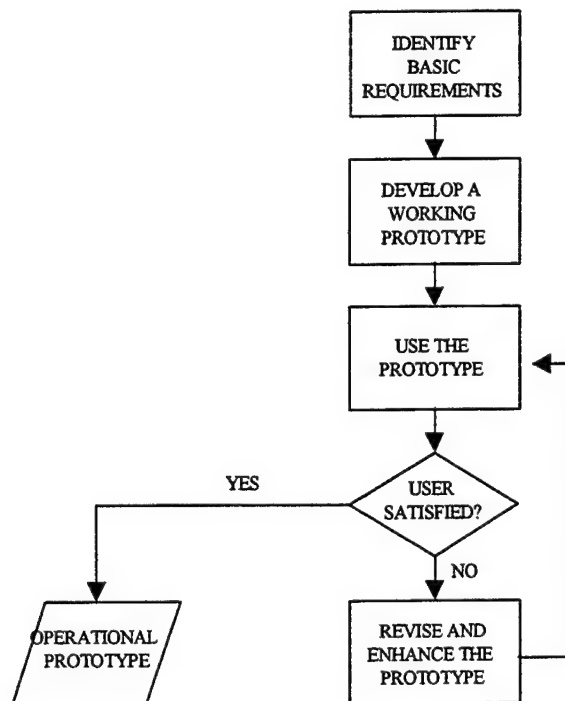


Figure 4.2. The Prototype Model [4.1]

prototype. Step two also involves speed. The developer need quickly create a working prototype, even if it is a shell with only restricted application, and return it to the customer. Next, the end user will use the prototype and make recommendations for revision. Step four involves revision of the prototype per the user's requirements. Completion of this step is followed by an iterative move back to step three until the customer is satisfied that all requirements for the system have been met [4.4].

Philips electronics envisaged the following benefits from use of rapid prototyping in software development for their products [4.5]:

- Early Customer involvement
- Improved specification quality
- No 'dead-end' demonstrations
- Shorter time to first product drops
- User friendly systems to the customer
- Less defects in latter phases of the lifecycle (and, thus, lower maintenance costs)

Additional benefits include [4.6, 4.7, 4.8, 4.9]:

- Better user interface development
- Continuous customer involvement
- Reduced development costs
- Very well suited for smaller applications
- Ensures nucleus of system is right (i.e., clarifies requirements and more exactly meets users need)
- Reduced levels of effort for staff
- Increased user enthusiasm
- Validation and verification are inherent
- Evolutionary nature enhances flexibility and scalability in a rapidly changing environment

This last point is a key consideration in choosing to use the prototype process. By recognizing the prototype process as involving the capture of human activity systems vice as a science or engineering tool [4.10], the processes suitability in situations with ill defined or rapidly changing environments may be viewed. Exposing the prototype to the actual environment can be seen as a learning method. As displayed in Figure 4.3

[4.11], this “learning process” is incremental in nature, as the product is iteratively reconciled against customer needs. It is this incremental learning which allows the

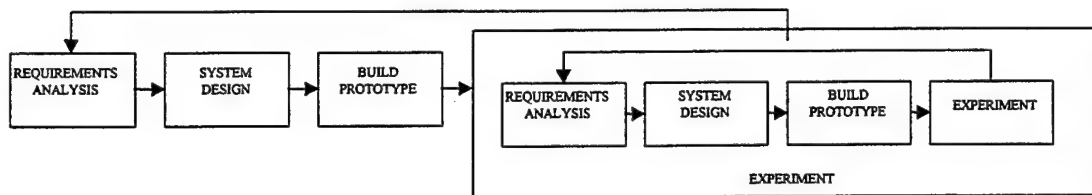


Figure 4.3. Nested Development Loop [4.11]

prototyping process to respond to rapid change in the environment, providing maximum flexibility in the maintenance phase of the lifecycle [4.12]. The iteration concept will be explored more fully later in the chapter.

Lest the prototyping process appear to be a panacea, the following list of potential problems is presented [4.13, 4.14, 4.15, 4.16]:

- Essential elements in system development may be glossed over (i.e., documenting system)
- Prototype may prove functionalities that are unattainable under real time usage of assets
- May lead to end user misunderstanding (user doesn't understand 'Under Construction' look and feel)
- Clean up of prototype may not occur (i.e., leaving unused/out-dated materials in place)
- Prototype may capture only rudimentary requirements (i.e., incomplete iteration)
- Difficult to maintain user enthusiasm, especially in the face of overselling the prototyping process. Can lead to dissatisfaction
- Difficult to plan and control; not suitable for large projects

- Design standards may be hard to enforce
- Potential for *loss of information security* (Security measures discussed in Chapter VII)

Another well-known pitfall is that throwaway prototypes often are not thrown away. This raises the discussion of throwaway prototyping verses evolutionary prototyping. The key advantage to creating a throwaway prototype is that actual requirements are still gathered via prototyping, but design is conducted separately, under more structured conditions. This action ensures better documentation, but earns the dangers inherent in traditional methods. The evolutionary process strives to develop a working model that will become the desired system, and is the basis for most of this chapter's material [4.17]. As mentioned in the above list, evolutionary prototyping can suffer degradation of quality attributes such as performance, design quality and maintainability [4.18]. In this instance case, the throwaway prototype option was rejected for reasons that will be discussed in Chapter VI.

C. SCOPE

The scope of the proposed prototype encompasses the building of a baseline Intranet for the 40th Mechanized Infantry Division. The prototype includes web pages down to the Battalion level, designed in a standardized manner. Rather than a "do all, end all" system, the prototype will contain only some key functions identified in Chapter VI, and will be turned over to the end user for continuous revision by members of the division as described in paragraph D and Figure 4.4.

Instead of the fourth generation tools typically used in prototype development, this prototype will be built with Commercial-Off-The-Shelf (COTS) web editors, word processors and database suites in wide use by the members of the division.

D. CURRENT INFORMATION OPERATIONS

The current means of managing information is time honored and effective, if not efficient. The predominant information exchange capability between and within units is the telephone. With the addition of the facsimile machine, this medium has expanded from a coordination tool, to one capable of transporting all manner of management information. MUX and FM facsimile equipment now available at the division level ensure this capability is available even in the field environment.

Computers have also aided dramatically, enabling an interactive medium via the electronic file. Information management systems have been developed for all major resource management programs to include supply, maintenance, personnel and operations/training control. These systems allow inter-echelon exchange of information via file passing/updating by disk or download.

Guard Mail, U.S. Mail, and expedited shipping means are also available for the physical transfer of paper and disk versions of information.

Finally, meetings and other face to face coordination are still a highly effective means of ensuring information is passed correctly, requirements are understood and orders will be complied with.

As mentioned, these methods may be used effectively, but suffer in terms of efficiency. Among the limitations of these methods is susceptibility of physical medium. While in transit, reports and other forms of information may be exposed to wrong parties

as control of the medium is lost after shipping/faxing. Anyone familiar with office management doubtless can relate stories of lost phone messages, compromised information files and unreceived materials.

Some important materials need not only be hand delivered, but also will require on-site review to ensure adequate and correct submittal. An example would be processing of unit readiness information or the coordination meetings prior to a drill period. The costs involved in this type of interchange are twofold. First, the actual cost of traveling, be it borne by the unit (TAD funds), or the individual soldier. Second, the requirement to be at the same place and time represents a major opportunity cost, especially when travel time is considered.

Similarly, phone and inter-unit meetings suffer from lost opportunity costs. While the timing of a meeting or a phone call may be optimal for the initiator, the other participant(s) may not be prepared to deal with the issue at hand, or may have more pressing requirements. Moreover, while methods like electronic file passing allow interaction, it is not real-time interaction. In short, these "information push" methods do not allow optimization of information and personnel across time and space for all parties.

E. ADAPTATION OF THE PROTOTYPING PROCESS FOR A MILITARY INTRANET

Perhaps the paramount requirement in successfully adapting the prototype process for any Intranet, military or otherwise, is to recognize that the process will be continuous throughout the life of the Intranet. Because content requirements, intended purpose of the Intranet, and number and types of users will change with the organizational

environment, the flexibility provided by the nested development loop identified in Figure 4.3 will prove invaluable in providing the needed flexibility.

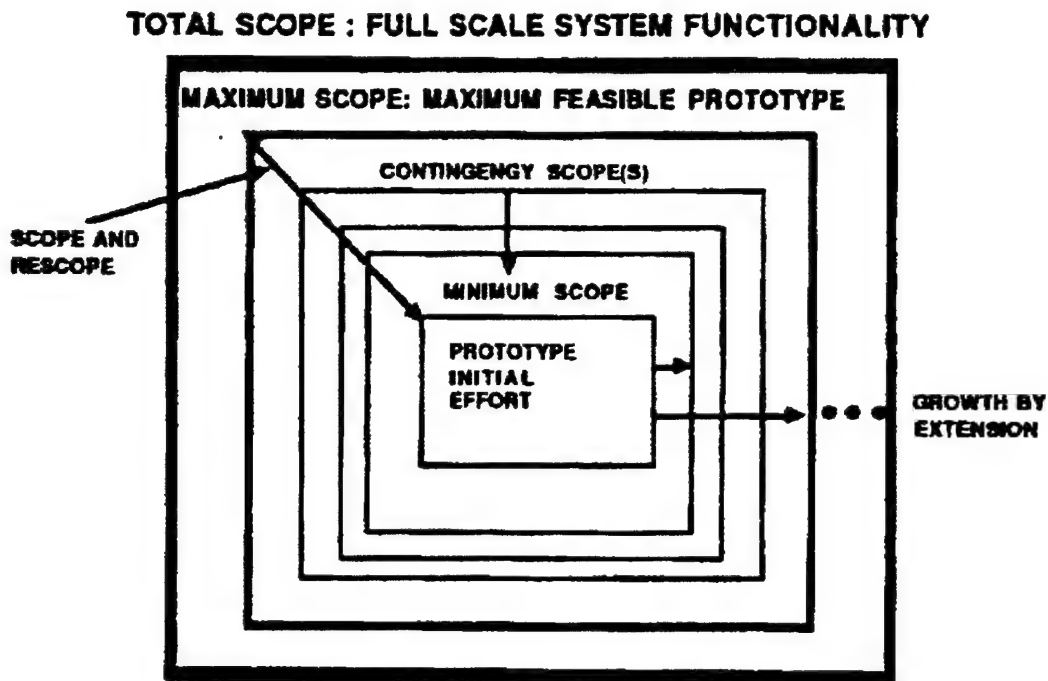


Figure 4.4. Migration of Scope [4.19]

As mentioned above, the prototype delivered to the 40th Division provided only minimal functionality and represents the prototype initial effort identified in Figure 4.4 . It will now become incumbent upon the division staff to expand the prototype via what is dubbed Black Border Management [4.19]. A section in Chapter VII will be devoted to the role of the Division Information Management Advisory Council (DIMAC) in managing and controlling this growth. Initially, the DIMAC will set basic policy and approve changes to the prototype as depicted in Figure 4.5.

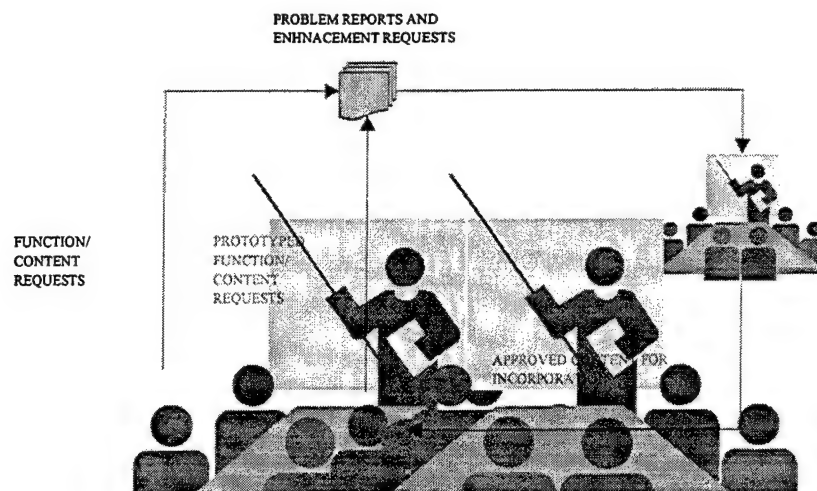


Figure 4.5. DIMAC Role

As the basic policies and procedures are identified, responsibility for development and maintenance of content will shift to the end user. At this stage, the prototyping process matures into an end-user development process, allowing the individual units, commanders and staff sections to provide and manage the content they deem most necessary under a changing environment. This represents the major content change to the standard prototyping process identified in Figure 4.2 above. It should be noted that the DIMAC still maintains control over the basic prototype design and content issues as shown in Figure 4.6, thus providing the division commander control over the Intranet prototype.

F. CONCLUSION

The prototype model has been introduced in a manner which provides comparison to more rigid development procedures. The major advantages, and those important to the Intranet project, are scalability, better user interface and satisfaction, and more flexibility

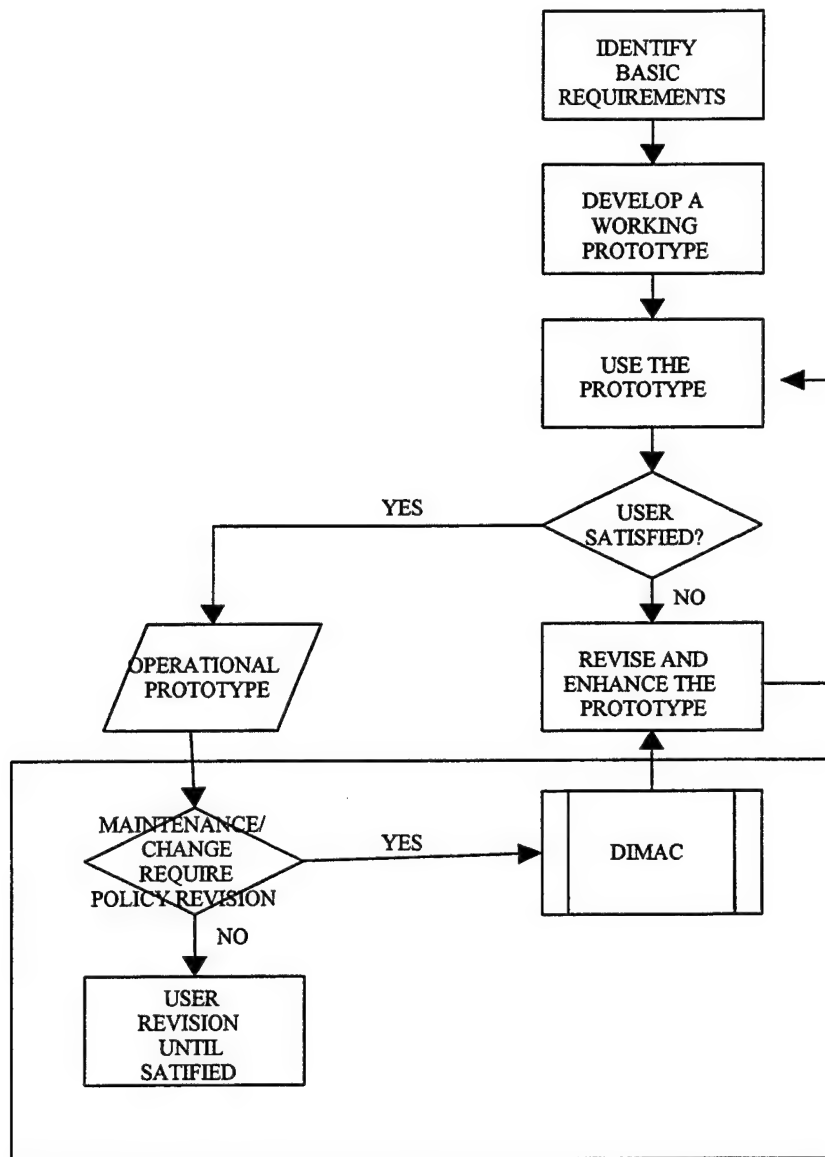


Figure 4.6. Modified Prototype Model

in the face of uncertain needs. The last advantage is enhanced when one realizes that the Intranet content will be ever changing, relying on end-user development after delivery, and providing considerable flexibility.

V. IDENTIFICATION OF BASIC REQUIREMENTS

A. INTRODUCTION

This chapter will explore the background and relationship developed with the sponsor and the 40th Infantry Division (Mechanized), the methodology used for gathering requirements, and a comprehensive discussion of the requirements used to generate the prototype discussed in Chapter VI.

B. BACKGROUND

In October 1996, the development team witnessed a demonstration of an Intranet designed for a Naval Postgraduate School application. This demonstration sparked an interest in the Intranet development technology and process. In an effort to find a relatively local military sponsor, the team visited a California National Guard tank battalion unit based at the former Fort Ord, California. During this visit, the team discovered the shortfall in network computing resulting from the closing of the RCAS system as discussed in Chapter I. It was also discovered that the 40th Infantry Division (Mechanized) was in the process of distributing personal computers and establishing a dial-in network, and points of contact were gathered which eventually led the team to LTC Rod Barham, the project sponsor.

Initial contact was made with LTC Barham, who proved more than interested in developing a web for use by his division, and spoke of an ongoing effort to create a division BBS. A system requirements meeting was scheduled for December, resulting in the trip report presented in Appendix A. After discussions with LTC Barham's BBS project point man, SSG Greg Holmes, it became obvious that the focus of effort to that

point was to set up the dial-in network to share information from the Logistics Automated System Support Office (LASSO) and establish e-mail accounts for key users. The broader issue of a division-wide information distribution system was not yet being fully addressed by these efforts [5.1].

C. PERSPECTIVE

Clearly, what was needed was a design plan incorporating the entire division, and absorbing the LASSO efforts as a portion of the larger system. The team discussed the need with LTC Barham, and it was agreed that this was the correct course of action to take. However, even the most cursory review of the information distribution system currently in use by the division indicated a problem scope well beyond the capabilities of a single thesis team. Accordingly, it was decided to limit the scope of the project, as discussed in Chapter IV, and three requirement areas were identified. First, a full scale Intranet static design would need to be completed. Second, additional functionality will be provided on a limited scale. Lastly, an effort would be made to arrange for follow-on students to continue to address functionality issues with the division. While this last requirement was successfully met, it is not the subject of this thesis and will not be discussed further. However, the first two requirements will be more fully explained in the below paragraphs.

D. REQUIREMENTS

Chapter IV briefly delved into the vast variety of current information management methods practiced at the division and discussed the key limitation of the lack of ability to optimize information and human resources across the time and distance continuum. While the information distribution systems were too many to diagram and consider, it

became apparent that the basic design for the proposed Intranet would need to provide the means of augmenting or replacing some of these methods and systems. To meet this requirement, the design would need to move the user from an initial "home page" through the various layers of command, with links to appropriate staff sections and activity pages at each layer. Further, it was decided that the Intranet design should be simple, have a consistent look and feel throughout, and be free of "bells and whistles" requiring the user to have fast modems or suffer extreme download times. These issues will be more thoroughly explored in Chapter VI, discussion of the actual Intranet prototype. Also, the Intranet would act as a template to ensure standardization, and should be accompanied with recommendations as to content control policy and successful use, as discussed in Chapter VII. Lastly, it was decided that the prototype would be designed with, and would need to be used in conjunction with, the Microsoft Office family of applications, already the standard at the division. This was done both to ensure the ultimate portability of the prototype, to address compatibility with local division information systems already developed, and to take advantage of a preexisting level of expertise in use of these tools.

Next, the initial requirements meeting addressed narrowing the number and kinds of functions to be built into the prototype Intranet once designed and developed. The first of these functions would be a personnel database to augment the SIDPERS database and provide more flexibility in reporting and data mining. The context level Data Flow Diagram (DFD) in Figure 5.1 illustrates the current system for retrieving information from the SIDPERS database. It should be noted that the major inefficiencies here are twofold.

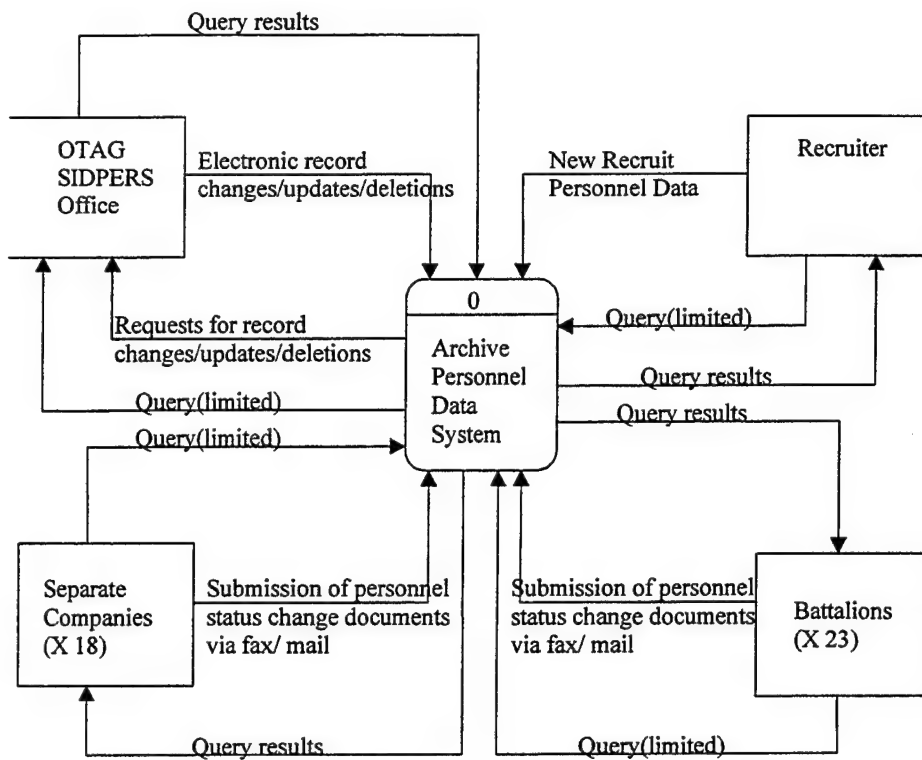


Figure 5.1. SIDPERS Procedures

Figure 5.2 shows that the process of submitting changes to the SIDPERS database is extremely cumbersome, sometimes involving providing a faster and more simplified process for making inquiries and providing a more up to date database from which to inquire and reconcile against the SIDPERS database. The team was to make no effort to link this concept vehicle to the actual SIDPERS database.

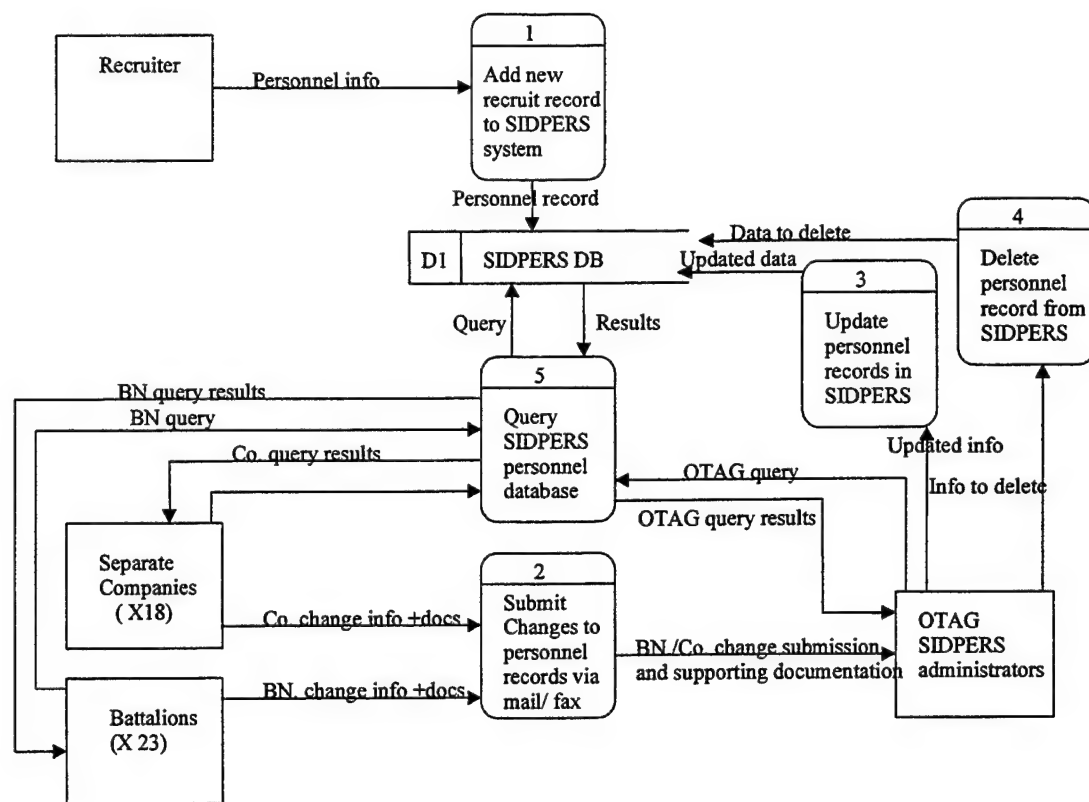


Figure 5.2. Level Zero Diagram of SIDPERS Procedure

It was also requested that the team look at simplifying procedures required to capture a unit's readiness posture via the Unit Status Report (USR). This report consists of over thirty pages and is currently handled as depicted in Figure 5.3. The reader should note that at least one representative from each battalion, separate battalion and company, and subsequent higher commands would be needed to participate in the effort described in the figure, totaling at least 42 people. It was this mass of administrative effort, information distribution and travel, for face to face coordination, the team was to address.

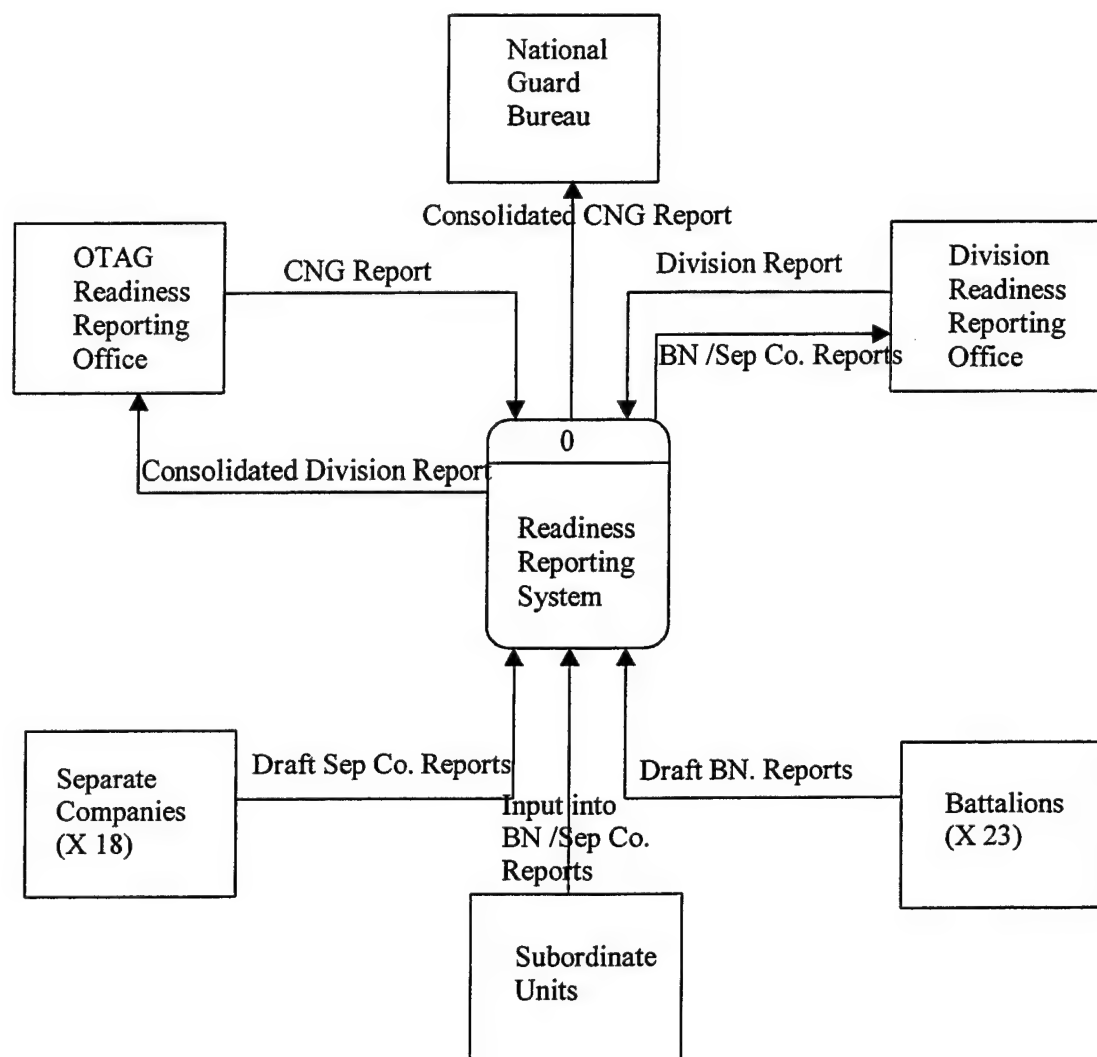


Figure 5.3. Context Level Diagram of USR Procedures

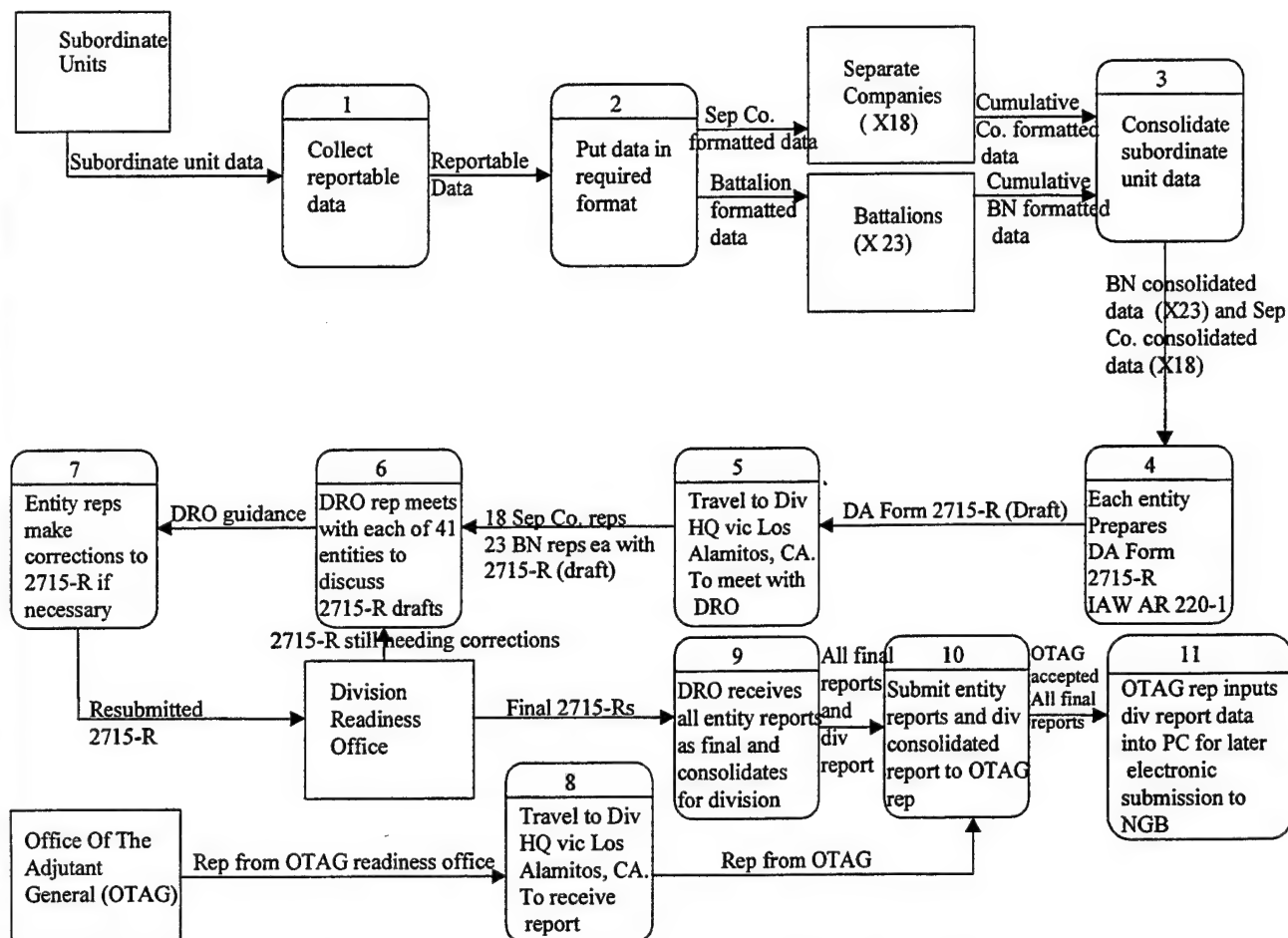


Figure 5.4. Level Zero Diagram of USR Procedure

Similarly, commanders at all levels often require a personnel status report, either as part of the USR performed each quarter, or to manage his/her personnel strengths. Figure 5.5 depicts the effort a typical battalion exerts in collecting and posting this information. It should be remembered that, because the sponsor is a reserve military organization, these activities are occurring at various homes throughout the month involved. Accordingly, the action required from the team was to identify those items of information most often needed and create an interactive environment wherein the

company commanders could readily ascertain the information requirements, annotate only that information which has changed, and return the information in a standardized format for rapid inclusion.

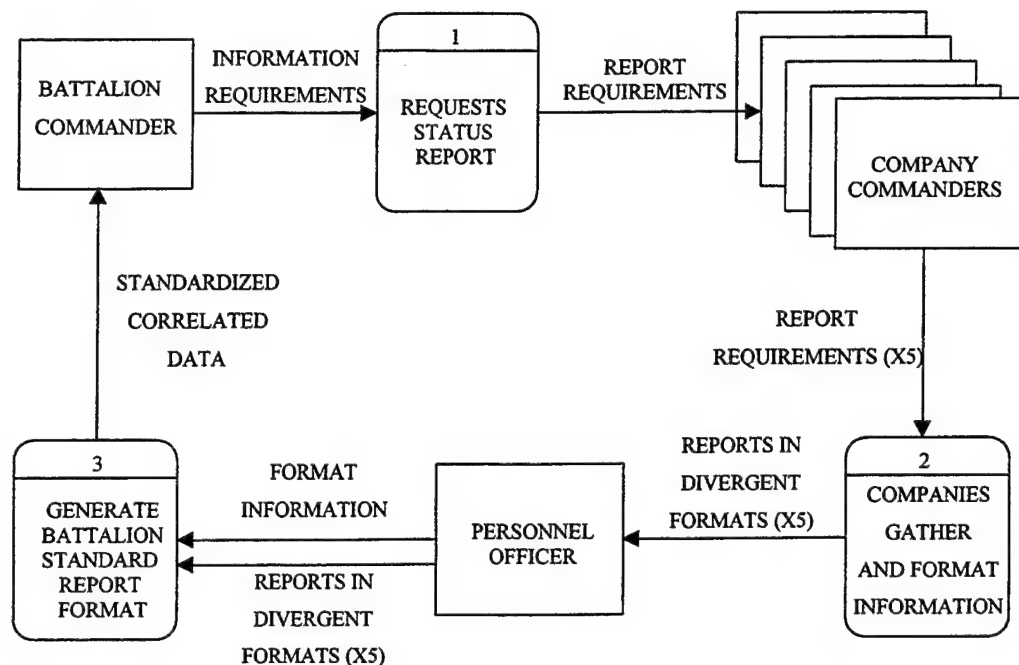


Figure 5.5. Level Zero Diagram of Personnel Status

The final requirement identified during the first trip and reported in Appendix A involves sharing information about major training activities and events at each layer of command. Currently, commands use a variety of scheduling tools such as Microsoft Organizer, Calendar Creator Plus, and assorted word processors to record and distribute information about planned activities. This information is then physically passed to those personnel identified by the creator as needing the information. Anyone outside the normal distribution chain who could make use of the information either must request it, or is ignorant of its existence. The requirement, then, was to develop a standardized

static environment that would be expected, could be used throughout the chain of command, and could be easily referenced by anyone with access to the Intranet.

These base functions are further reviewed in detail in Appendix C, with discussion by function for the following areas:

- Entities affected
- Number of users
- Primary owners
- Frequency of use
- Mode of use
- Type and source of information
- Miscellaneous information

Appendix B is a trip report, which records the events of a second meeting with the project sponsor. There was a dual purpose to this trip. First, the prototype developed since the first meeting was demonstrated to determine that the skeleton design and functions built to represent the needs identified above were on target. Next, a structured walkthrough was to be performed with each of the organization's key staff members to identify any additional requirements. These requirements would ensure that the prototype meets the nucleus needs, a must for the Intranet to succeed.

As to the results of the former, the demonstration to the key sponsor of the skeleton design and key functions indicated that these efforts were on the mark. The sponsor gave the approval to proceed with development of the Intranet exactly as prototyped. While the latter activity identified no new nucleus requirements, a number of "nice to have" requirements emerged. Since it was deemed important that the key staff

involved in this process support the concept of an Intranet if the scheme were to succeed, as many of these functions were incorporated as time allowed. The requirements for those functions incorporated are discussed below.

Overall, it was agreed that the biography template (complete with digital image) was viable for the Commanding General, Assistant Commander (Maneuver), Assistant Commander (Support) and the Sergeant Major. Subsequent layers of command would contain biographies for the Commander, Executive officer and Sergeant Major.

The officers and non-commissioned officers of the personnel and administration section, the G-1, determined that a requirement for a directory of staff officers and senior non-commissioned officers with phone numbers and addresses existed. These directories are traditionally maintained and distributed in paper format, and are very difficult to keep up to date. Often, the paper copy is not present when needed, and reduced copies are often carried.

Another problem often faced by G-1/S-1 is locating and copying the many standard forms used by the Army. The need existed for a centralized repository of downloadable electronic versions of these standard forms, and the potential existed for use of the Army standard form generator, Form Flow by Delrina.

Finally, the G-1 identified the need for a report matrix, which would contain a list of required reports, indications of who was responsible for submittal, and when the report was due. It was generally agreed that these "suspense" pages would be a usable tool for each staff section, and would be added to each section's content.

The intelligence personnel of the G-2 identified a unique need. These personnel are involved in a process of continually updating and distributing an unclassified threat

brief for subordinate unit intelligence personnel and commanders. By nature, these reports will be out of date before the recipients can obtain and read them. The team's objective was to create a readily updateable vehicle for conveying these reports.

The G-2 further identified a problem that many staff officers share. As the Division Intelligence Officer, Division Logistics Officer, Division Personnel Officer, etc., these staff officers represent their occupational skill as the senior member in the organization. As such, it is incumbent on them to monitor staffing levels within the division for those personnel in their field in order to balance deficiencies and overages between units, and to notify the commander and Army manpower agencies when major deficiencies are identified. Accordingly, it was requested that the team develop a means for these managers to conduct a query and receive data on the present and future population of any given Military Occupational Specialty.

The operations staff in the G-3 had several functions to be added to the Intranet prototype. Perhaps the most important of the functions was the event calendar identified earlier. The G-3 usually maintains an event calendar showing major training events. A related function is provided by the Standard Army Training System Version 4.0. This CD delivered product provides both scheduling tools and standard training and training requirements reports and forms. It was requested that the team research this tool and discern what level of interaction with this system the prototype could achieve.

Another derivation on an earlier identified need was an action oriented suspense page, as opposed to an administrative report suspense page. The Logistics officials in the

G-4 also desired an action-oriented page. The team's task was to develop a template page wherein required actions and updates on event planning could be posted for all to share.

Figure 5.6 illustrates a coordinating procedure known among the reserve officers as "Dark Night". The concept behind this procedure is that planning documents for upcoming drill weekends are distributed for review and key members from staffs up and down the chain of command travel to a central location on the Thursday prior to a drill to coordinate required actions and the review plans. These officers then travel back to their homes, work Fridays and travel once again to their unit for weekend drill. The reader should note that both the cost of distribution of plans and travel for coordination are normally absorbed by the individual officer. There is a clear requirement, then, for a method of distributing and discussing drill plans before a weekend which lessens the time and cost to the officers.

In addition to the event page described above, the G-4 also identified the requirement to provide a viable means for requesting supplies and services in a fashion which ensures approval from the logistics shop at the subordinate command. The sponsor identified the need to specify procedures for determining requirements and ordering supplies by their class of supply (I-X). Further, several local forms used to request such services as bus support or convoy permissions have been developed and are currently handled in paper format. The Intranet was seen as a good vehicle for distribution of these forms and providing a means for submittal of requests.

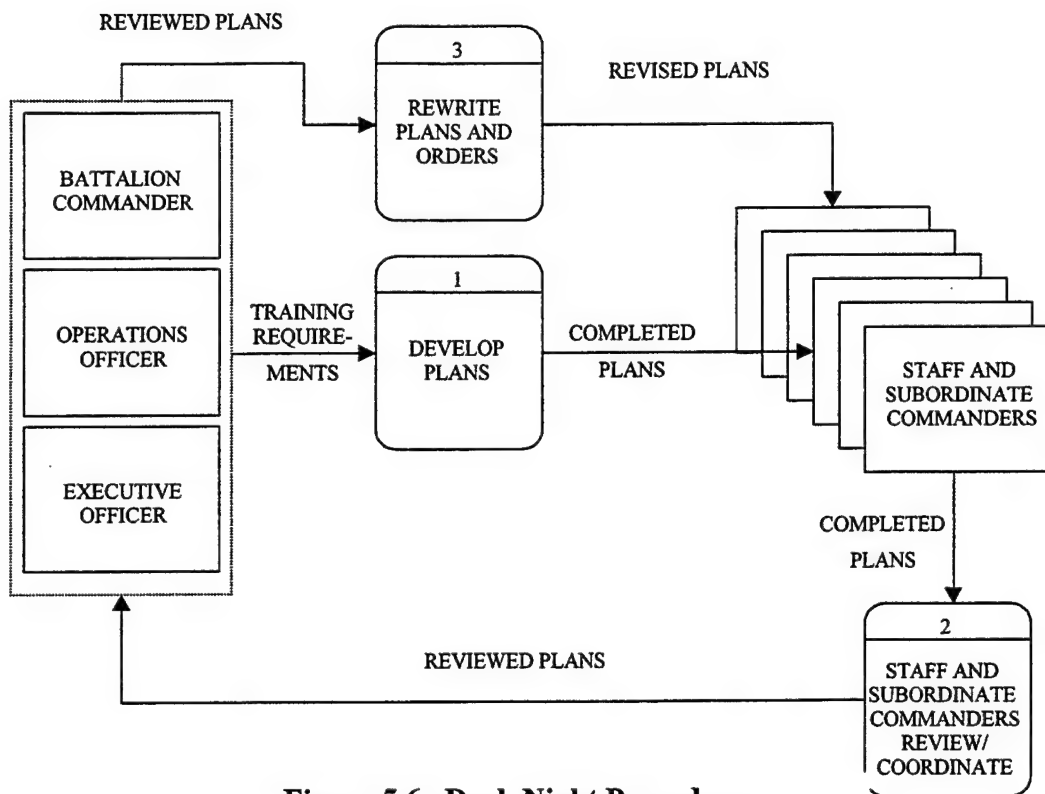


Figure 5.6. Dark Night Procedures

Relations with the organization have also identified the requirement for the team to provide recommendations on content quality and control. It is recognized that since the Intranet is to reside on government owned equipment and be available to government employees, the system content should be in accordance with both societal norms and current regulations. A thorough identification of Army and DOD requirements and valuable content control measures from civilian organizations is needed.

As mentioned in Chapter IV, these ongoing relations have also identified the need for the team to provide recommendations on potential security directions that the division should consider.

E. CONCLUSION

This chapter sought to acquaint the reader with the most plausible of the division's requirements, as determined by the Intranet team's ability to provide solutions. The requirements were broken between the essential design, some priority functions and some nice to have additions designed to ensure support by those key staff sections whose participation is needed if the Intranet is to succeed. While implementation of the basic design, key requirements and nice to have items will be discussed at length in the forthcoming chapter on prototype implementation, the last two considerations involving recommendations on security measures and content control procedures will not be addressed again until Chapter VII.

VI. THE PROTOTYPE

A. INTRODUCTION

The goal of this chapter is to walk the reader through the prototype development process actually followed in creating this Intranet prototype, and explain the design and functionality evolution that transpired along the way.

B. DEVELOPING A WORKING PROTOTYPE

Following the prototyping process defined in Chapter IV and represented in Figure 4.2, the first step in prototype development is a very rapid determination of the user's basic requirements. Chapter V discussed the gathering and definition of these initial requirements. The team's goal in developing the "first cut" prototype was to provide a very limited, rapidly produced set of Intranet pages incorporating the major functions to simultaneously validate and verify the initial direction of the project. The below paragraphs describe and exhibit the efforts made in developing this first cut prototype.

The first requirement to be addressed was, by necessity, the basic design of the Intranet, the cornerstone of the project as a whole. The primary consideration here was that a division viewpoint should be used to guide the design development. The reader may remember that Figure 3.1 shows the structure of the 40th Infantry Division first introduced in Chapter III. The average military member is fairly conversant with this structure and most activities are controlled using personnel along this chain of command in a hierarchical manner. As a consequence, the team believed that this design, which followed the organization's structure, would be the most intuitive way for users to

navigate the web. Figure 6.1 shows the structure of the Intranet. This “screen shot” represents what will be called the left frame. It is this frame which becomes the vehicle

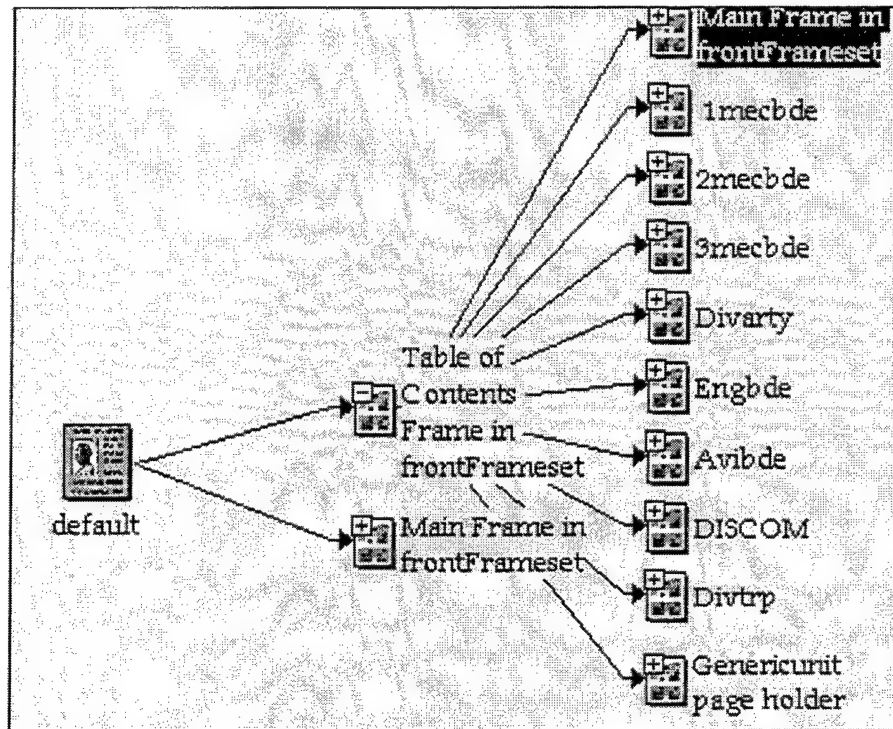


Figure 6.1. Left Frame Layout

for navigating the Intranet via the command structure. Note that only the major commands are listed on this page.

Figure 6.2 shows the structure of the right frame the user encounters upon selecting a unit from the left frame. As can be seen by the concentric layering, this frame provides the method for navigating at any given level of command. Each level contains links to both staff sections and subordinate commands. It is also in this frame that the links to the required functions identified in Chapter V will exist.

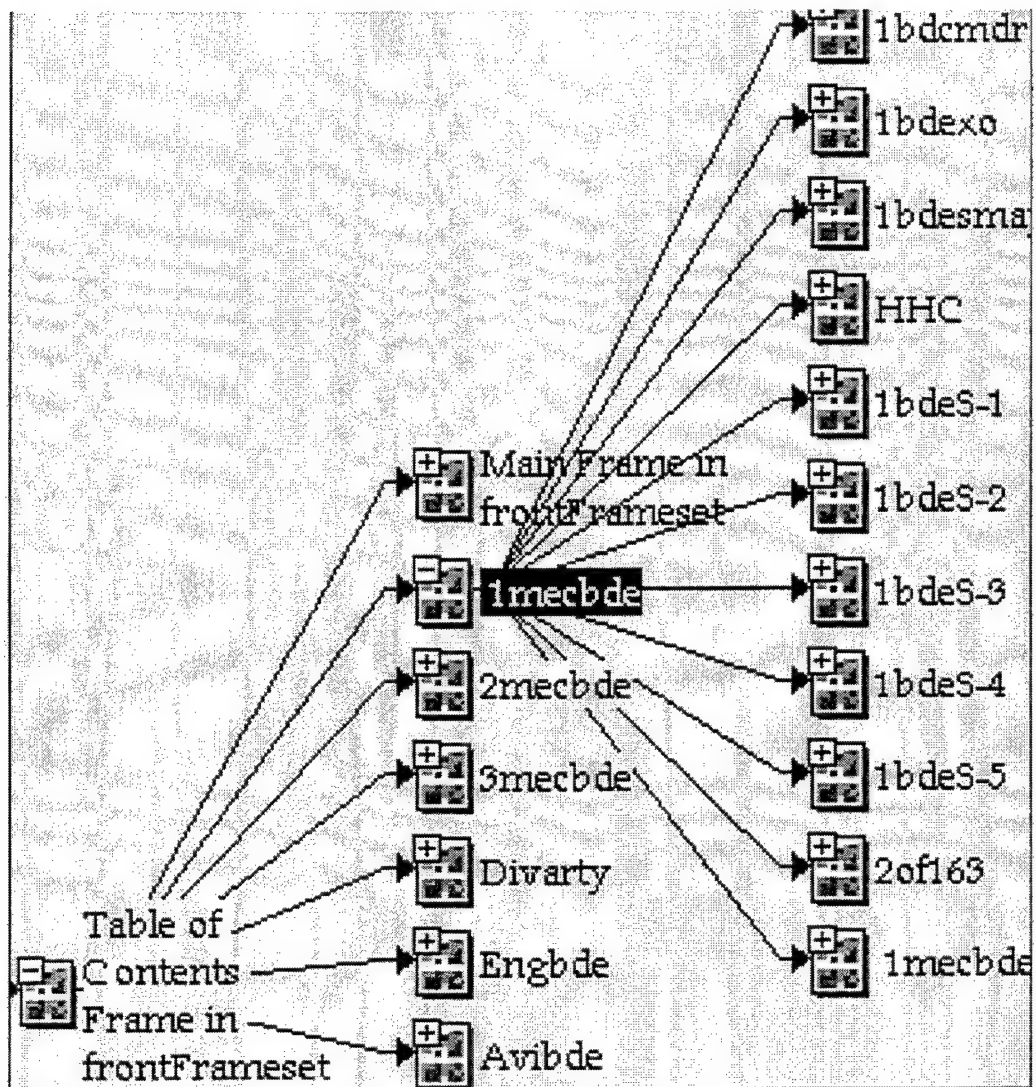


Figure 6.2. Right Frame Layout

Figure 6.3 provides a view of the initial frames as seen from a browser.

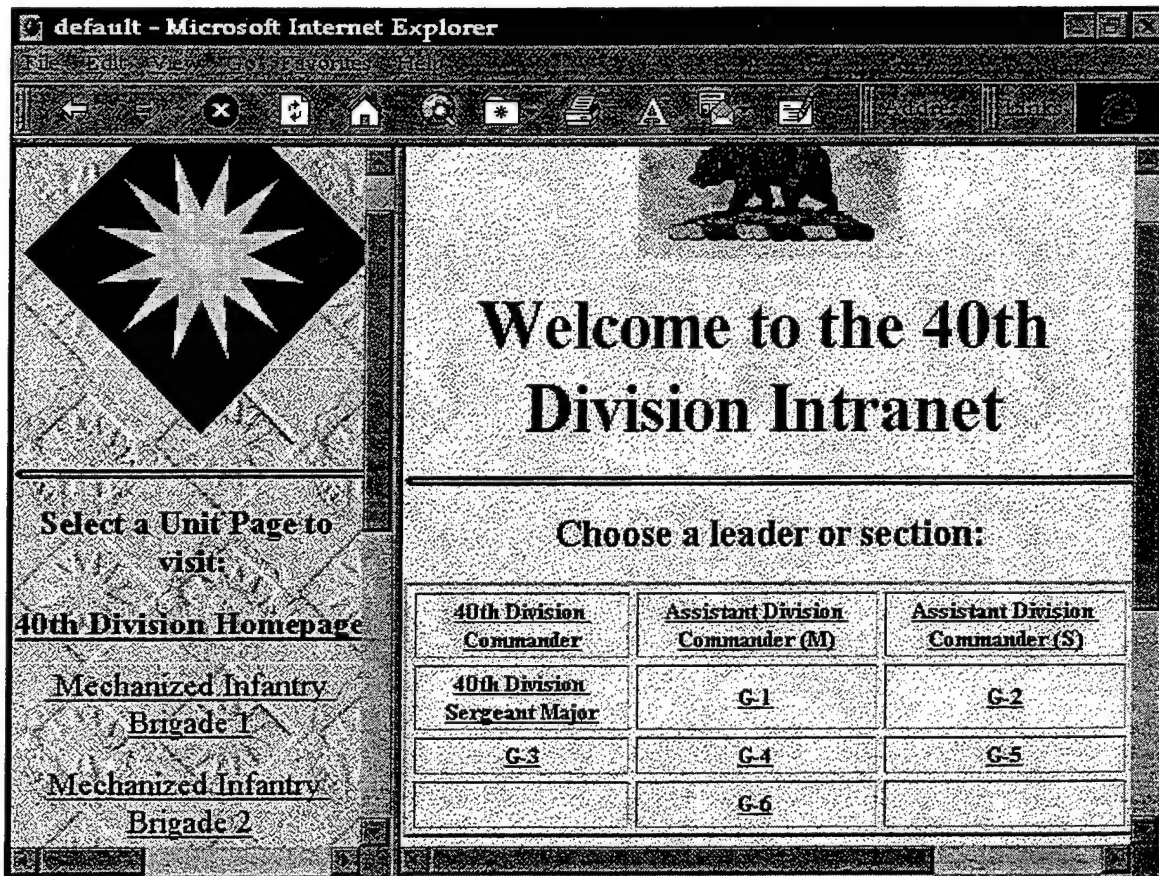


Figure 6.3. Opening Screen

Figure 6.4 demonstrates the change the user would witness to the right frame if selecting the G-4 link in Figure 6.3. The reader should note that the functions identified for the G-4 in Chapter V are represented as links in the new matrix. It should also be noted that the left frame is never changing, providing the user with a means of easily moving from one major command to the next, and always returning to the "home page" represented by the upper level Division page seen in Figure 6.3.

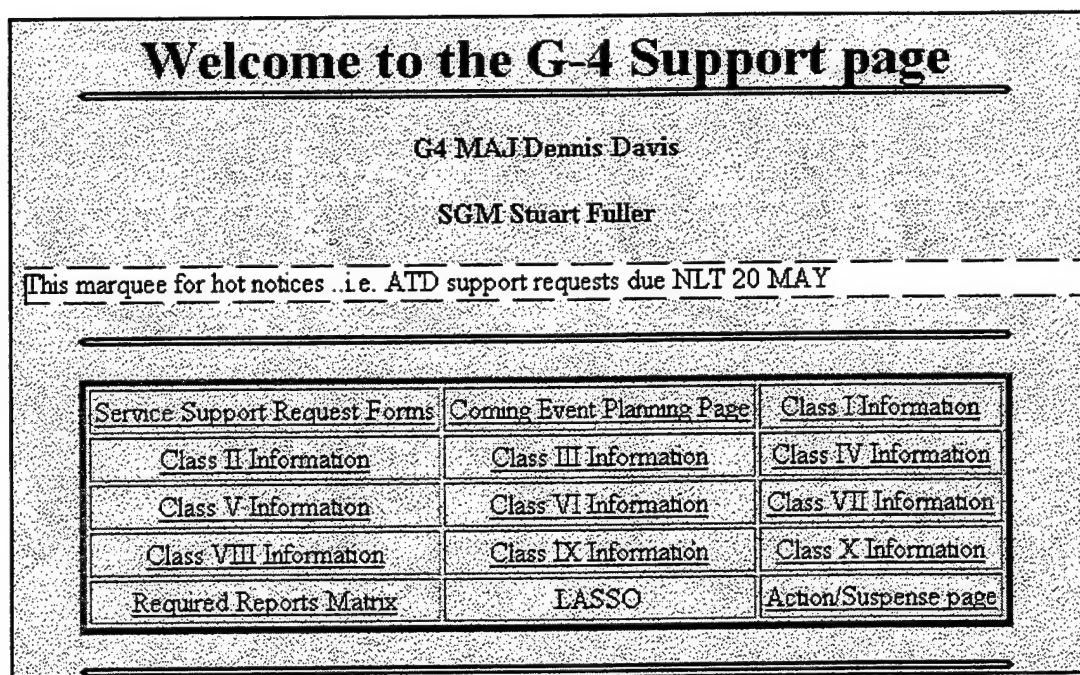


Figure 6.4. G-4 Selected

Figure 6.5 displays the right frame presented when the user selects the 1st Brigade from the left frame. Attention is directed to the similar structure of the right frame between the commands. Even though subordinate units have now appeared in the matrix, the overall format remains the same to improve intuitive browsing by the user. Note also that the staff sections are represented, but now show the “S” designation vice the “G” designation used at the division level.

Another primary design consideration is the speed with which the system will respond. Efforts to ensure a rapid response of the system included simplicity and standardization of color, number of page formats and page design. Since the left frame never changes, this page is always cached on the user's computer after initial download. Similarly, the background for the right frame (at any level of command) is composed of a single picture of brown “spray paint” speckles designed to load quickly. There are only

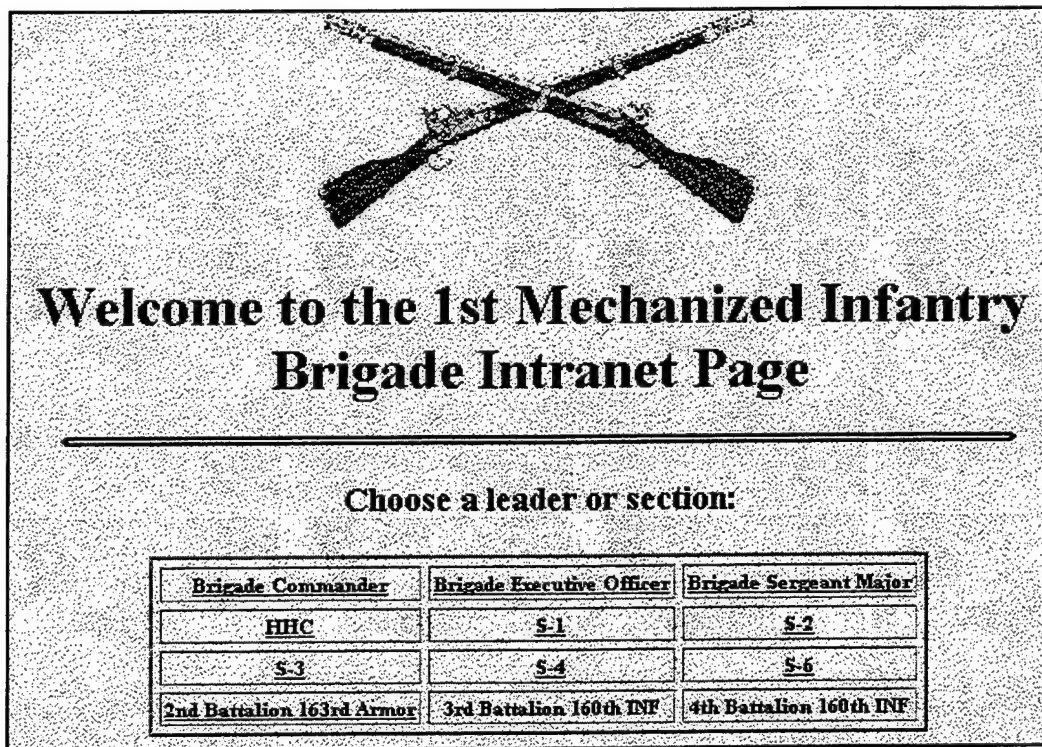


Figure 6.5. 1st Brigade Home Page

two other backgrounds used in the right frame of the Intranet. Once below the staff level at any command, the user encounters a white background with a watermarked U.S. Army insignia. Below this level is a white background with a watermarked 40th Division insignia. Again, once downloaded, these pictures are cached, and will quickly return upon change of levels. Page design was kept simple, with the same, quick loading delimiting lines and standardized artwork throughout all layers of the Intranet. Sounds, video streaming and other time and space consuming features were avoided.

The next requirement addressed was the personnel database. What the team heard initially from the project sponsor, in reference to tracking personnel information, was that the information provided by the state's SIDPERS database is outdated and does not provide a timely and accurate reflection of the personnel status in the division. Another

complaint about the SIDPERS system was the limited access and limited querying capability. The scope of the project prevented attempting changes of a large legacy system such as the SIDPERS system. Rather, it was our intent to show the division the dynamic functionality available which, with further analysis, could set the stage for the development of a full-blown web-based internal (within the division) personnel database management system. The personnel management system should be developed so that it can work in concert with the legacy SIDPERS system and focus on overcoming its shortfalls (i.e., no timely data updates, limited access, limited querying capability). Ideally, the two systems would interact so that data could be shared. Which personnel information fields to track and place in the dynamic database was determined by studying a stand-alone database put together by the 240th Signal Battalion. The developed prototype consists of two input forms which contain sixty-eight fields of personnel related information. One of the two input forms is pictured in Figure 6.6.

Soldier Data Form (1 of 2)									
UnitID	UnitName	PARALINE	AUTHMOS	ASI	ASIZ				
1	Aco 640th M		95B						
AUTHGRD		TITLE		LastName		FirstName			
E-7		Imagery Specialist		Jones		Robert			
SSH	Rank	Status		Grade					
11-11-11	PVT	Active		E-7					
PMOS	PMOSQ	DMOSQ	SEX	SECCLN		SMOS			
95B	95B	95B	F	IS		711			
AMOS	AMOS2	Deployable	ExcessCode		DOR				
		DEPLOYABLE	0000		02-Jan-97				
ETSMRD	RYEDATE	PEBD	DOB	Bonus		Remark			
02-Jan-00	02-Mar-97	02-Nov-97	02-Dec-75	no					
Find Record		Return to switchboard			Go to form 2 of 2				

Figure 6.6. Data Entry Screen

We demonstrated to our sponsor the ability to store and retrieve database records using the input screens put together for the initial demonstration. It was agreed that further development in this area would focus on the SIDPERS shortfall areas (i.e., query capability, accessibility, data timeliness and accuracy, etc.).

The requirement for a local personnel status reporting form was fully addressed before the next meeting. A spreadsheet solution already used by division (See Figure 6.7) proved to be the answer. Another spreadsheet solution was available from the 240th Signal Battalion. While both solutions were included in the prototype, further discussions as to the solution will refer to the division model. This spreadsheet can be adapted to work at any level of command. The team took advantage of "working together" inherent in using all Microsoft Office compatible tools, and linked the report to the G-1/Personnel page. Once linked and selected by the user, this file will regenerate on any computer having Microsoft Excel. For those who do not desire to load Office products or other executable suites on their Personal Computers, the webmaster can make available downloadable viewers for various products, or direct the user to the company's web page on the internet, where viewers are almost universally available for download. If the user desires to make changes to the Excel file and return it to the Battalion (via E-mail attachment or FTP), an executable version of Excel or Excel compliant spreadsheet must be resident on their PC.

Microsoft Excel - MASTER.rpt

File Edit View Insert Format Tools Data Window Help

40th Infantry Division (Mech)

Master Report

Prepared By Division Readiness Office

UNIT	DMOS QUAL		MSPER QUAL		AWOL		CONST ATT		STR AOL1		AVAIL STR		RETENTION		TURN
	RANK	%	RANK	%	RANK	%	RANK	%	RANK	%	RANK	%	RANK	%	RANK
579TH ENG	6	80%	1	93%	5	4.5%	6	87.6%	1	127%	1	125%	9	56.7%	7
2-185TH AR	11	76%	2	88%	4	3.7%	2	92.0%	8	88%	3	95%	1	100.0%	9
578TH ENG	5	82%	3	87%	7	4.7%	4	89.1%	8	89%	7	90%	1	100.0%	1
640TH MI	23	41%	20	66%	1	1.7%	5	88.1%	6	90%	5	92%	1	100.0%	16
1-140TH AV	20	72%	8	79%	2	3.1%	8	65.1%	4	94%	5	92%	15	57.1%	10
1-149TH AR	15	74%	13	73%	3	3.2%	1	92.9%	14	84%	18	79%	7	73.7%	10
340TH SB	12	75%	14	72%	8	4.9%	22	80.4%	11	85%	11	84%	4	87.5%	2
3-160TH IN	1	89%	16	69%	12	5.8%	10	84.7%	18	79%	19	73%	12	60.0%	4
1-185TH AR	20	72%	18	67%	5	4.5%	3	90.3%	6	90%	14	82%	8	68.8%	23
3-185TH AR	7	78%	11	75%	19	7.6%	14	83.0%	11	85%	12	83%	6	75.0%	10
1-18TH CAV	12	75%	17	68%	13	6.2%	9	85.7%	15	82%	21	72%	5	83.3%	3
40TH SB	22	71%	7	80%	23	10.4%	13	83.6%	3	98%	7	90%	9	66.7%	20
240TH SIG	9	77%	11	75%	22	9.7%	23	74.5%	5	92%	7	90%	9	66.7%	7
3-144TH FA	4	83%	5	85%	17	7.1%	18	61.7%	23	54%	4	94%	13	58.3%	17
1-143RD FA	16	73%	8	79%	16	6.9%	16	82.4%	15	82%	12	83%	13	58.3%	5
4-160TH IN	3	84%	6	84%	21	9.6%	17	82.1%	11	85%	7	90%	16	55.6%	13
132ND ENG	16	73%	4	88%	20	8.1%	11	84.2%	2	101%	2	108%	22	40.0%	22
540TH SB	9	77%	21	65%	11	5.7%	7	86.6%	18	79%	19	73%	19	50.0%	15
240TH SB	16	73%	18	67%	9	5.1%	12	83.8%	10	87%	14	82%	22	40.0%	5
2-160TH IN	7	78%	10	77%	10	5.5%	15	82.5%	17	81%	16	81%	18	52.2%	21

Master Rpt / Str Fig's / Sheet3 / Sheet4 / Sheet5 / She

Figure 6.7. Personnel Master Report Spreadsheet

This function met with approval as displayed, and no further revision was necessary.

Figure 6.8 provides a view of a basic weekend timeline saved in HTML format from Microsoft Schedule Plus. This schedule was prepared as an example of what may be done in the field of event scheduling. The reaction to this schedule and the other functions discussed above will be the subject of the next section.

Week of 2/23/97

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
07:00 AM							
07:30 AM							
08:00 AM	DRILL WEEKEND						DRILL WEEKEND
08:30 AM							
09:00 AM							
09:30 AM							
10:00 AM							Div CPX
10:30 AM							
11:00 AM							
11:30 AM							
12:00 PM							Lunch
12:30 PM							

Figure 6.8. Microsoft Schedule in HTML

C. INTERMEDIATE STEPS

1. Demonstration of the Prototype and User Satisfaction

As brought out in Chapter V, a structured walkthrough was conducted with both the sponsor, and members of the division's primary staff. This step provided the following results:

- The basic design was considered satisfactory, and the team was requested to continue filling out the "skeleton".
- The command was very pleased with the concept demonstrated by the Active Server Page – Database combination, and desired a continuation along this path, providing some further guidance as to desired functions, to include the MOS search identified by the G-2.
- The Personnel Status Report was blessed "as is", and the team determined to spend no more effort on this tool.

- The training schedule example served its purpose as a vehicle for generating follow-on requirements. While some purposes could be served by the daily/hourly format afforded by the Microsoft Schedule Plus format, the more universally used Calendar Creator Plus format was desired. The "event box" feature allowing a multi-day view of a single event ensured that Calendar Creator had become the de facto division standard.
- At the time of the structured walkthrough, not enough information about the Unit Status Reporting procedures had been gathered to include this function in the initial prototype.

2. Gather Follow-on Requirements

At the second meeting with the project sponsor, the prototype walkthrough was repeatedly conducted with each of the senior officers and staff non-commissioned officers from each of the sections. As stated in Chapter V, the purpose of this activity was to gather additional requirements for follow-on inclusion in the prototype. These requirements took shape both in the form of those identified for the basic functions above, and also the "nice to have" items which would help increase support of the project within the division. The additional liaison with the organization also helped to provide more information on and better substantiate the requirements for the USR task. While Chapter V has already covered these requirements in adequate detail, the next section will describe how the development team met these needs.

B. ENHANCEMENTS TO THE PROTOTYPE

The discussion on the revision of the prototype model begins with the interactive personnel database. The utility in having an accessible database in a web environment is that those authorized access can use it as a decision support tool by way of useful queries. Microsoft Access provides the capability to save queries and forms in HTML format. Active Server Pages created by Microsoft are HTML pages which are created by the


Switchboard			
Object	ObjectType	LastModified	Description
<u>>=E-7</u>	Query	4/14/97 4:24:04 PM	
<u>females</u>	Query	4/14/97 3:51:13 PM	
<u>flags</u>	Query	4/14/97 4:17:11 PM	
<u>GT>120</u>	Query	4/14/97 4:20:00 PM	
<u>MOS</u>	Query	4/14/97 3:44:45 PM	
<u>nondeployable</u>	Query	4/14/97 4:14:17 PM	
<u>weaponqual</u>	Query	4/14/97 7:56:43 PM	
<u>First</u>	Form	4/30/97 9:07:42 AM	
<u>Second</u>	Form	4/30/97 9:08:31 AM	

Figure 6.9. MS Access Switchboard

server “on the fly” or dynamically. Figure 6.9 depicts an MS Access generated switchboard. Access 97 allows you to save forms and queries in HTML format and provides a convenient way to access them via switchboard that contains links to the desired form or query. Figure 6.10 shows the results of a query for all soldiers in the grade greater than (>) or equal to (=) E-7. This HTML results page was dynamically generated by the server software and sent to the client browser. An endless number of queries can be generated using any number of the 68 data fields and posted to the switchboard. As can be seen on the switchboard in Figure 6.9, a Military Occupational Specialty (MOS) query was developed in the prototype which allows users to query for a particular MOS, a requirement discussed previously.

>=E-7					
Grade	LastName	Expr1002	SEX	PMOS	UnitName
E-7	Carter		M	11B	Bco 2-160 Inf
E-7	Berry		F	71L	HHC 40th Inf Div
E-7	McNamara		M	19K	1-149th Armor
E-8	Howard		M	31C	Cco 240th Signa

Figure 6.10. Query Response Page



Welcome to the G-3 Support page

G3-LTC Keith D. Jones

HHC training schedule	Significant Events Calendar
SATS Reports	Division Unit Status Reporting (USR)
Division Information Briefing	

Back to Top

Figure 6.11. Connection to USR Templates

The USR requirement was solved in a manner very similar to the Personnel Status Report effort. The 31-page report was found in a format that could be saved as a Microsoft Word template and saved in the web as a file. Figure 6.11 displays the link between the G-3 shop's web page and the file. When the user selects this link, the file is downloaded and can be saved or manipulated, then E-mailed back. Further, once downloaded, these files can be viewed and manipulated within a teleconferencing tool that will be described in greater detail in the Dark Night paragraph below. By using these methods, the 42 plus unit representatives can be spared the time and expense of physical file transfer and face to face coordination (represented in Figure 5.4) currently taking place each quarter.

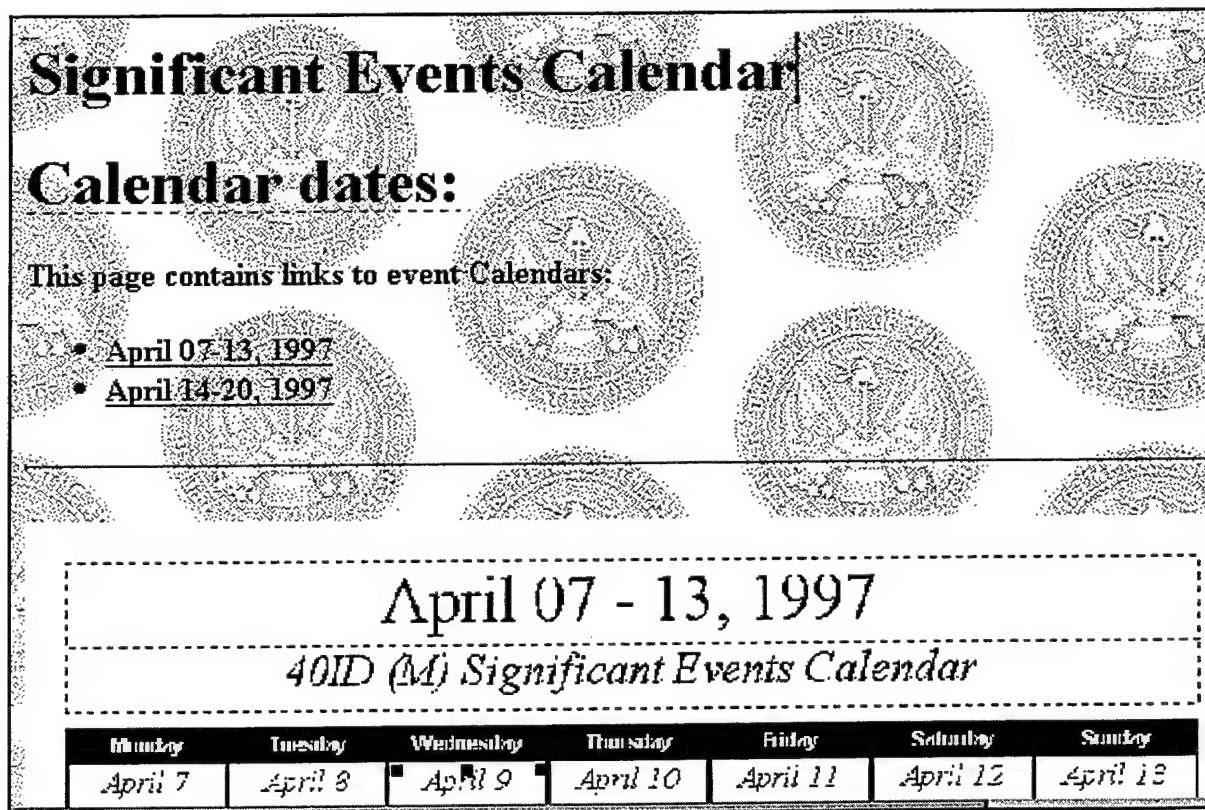


Figure 6.12. Event Calendar Index Page

Figure 6.12 displays the actual sample page created to answer the problem of a standardized event calendar. Contact with the Soft Key Corporation, makers of Calendar Creator Plus (CCPlus), indicated that no effort was currently being expended toward making an HTML version of their product. Since CCPlus was clearly the tool of choice among the division's planners, a method of posting the calendars already being created appeared to be the most viable solution. Accordingly, the team created an index based web page with the standardized background and look. The user first encounters the top of the page, which shows date blocks for that level of command's calendars. When a date is selected, the page advances to that portion with the CCPlus calendar pasted directly to that section, as shown in the Figure. Using this template page, units up and down the chain of command may now post their training and event planning calendars on their unit's web. These planning tools will then be available for absorption by members of the command, and for coordination with higher level and adjacent commands.

Of the additional functions requested by various staff sections, one of the most useful was a directory model that could be used at each level of command to keep up to date points of contact. The template represented in Figure 6.13 is also based on an index web page design. When a letter is selected, the browser proceeds to that portion of the page and the data is presented. Since the data is cross-referenced by name and billet, either an individual or all persons in a particular section can be displayed. Moreover, a web connection to that person's E-mail address can be installed. When selected, this connection will launch the user's default mail program, enabling immediate message writing capabilities. Additional useful information has been appended to the end of the directory. These include a listing of all E-mail account holders and a listing of all unit

addresses and duty telephone numbers. This template could easily be used in conjunction with a password-protected web structure to provide home addresses, phone numbers and “social rosters” often tightly controlled in paper form. If each layer of command were to copy and maintain this directory, a very up to date point of contact hierarchy could be easily laid out, with links from a central page at the division level to subsequent layers of command.

Division Staff Directory

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z Unit phone
#e-mail

Select the first letter of the name or billet. If the name or billet you are looking for starts with a digit or symbol, choose the # link

- A -

Last name, first name and middle initial, rank, billet, phone #

Atkins, Johnnie J., Jr., LTC, G-5, (310) 327-3721 jjatkins@divhq

Figure 6.13. Division Directory Page

To facilitate use of the directory, the team also decided to add a search engine function on the division’s home page. By typing a name, billet or function into the query block, all the pages contained within that web will be searched for mention of the

requested "term", and return a matrix of connections which provide links to the pages on which the term can be found.

While it might prove possible to run the Form Flow executable program from the network server, running it within the prototype was infeasible. However, the team did have some success in dealing with this application. By saving the files for each of the forms in the format used by Delrina's Form Flow, then storing them within the web, a link to each form could be made. Like many of the applications identified above, any PC with the Form Flow executable file could download and manipulate the files. This setup allows the client PC to be as thin as possible, alleviating the need for storing seldom used formats, and allowing access even when traveling.

The next function the team addressed involved the Required Reports page identified as essential by the G-1. Figure 6.14 depicts the page developed to handle this

Required Reports										
Reports due on date indicated.										
	January	February	March	April	May	June	July	August	September	October
Report1	15th C									
Report2			1st A			1st A			1st A	
Report3	15th	15th	15th	15th	15th	15th	15th	15th	15th	15th
C= Commanders to submit, A= Adjutant action, No letter designator= SI action										
Last Updated on 3/18/97										
By Tom Heckroth										
Email: nheckro@nps.navy.mil										

Figure 6.14. Portion of G-1 Required Report Page

need. A table generator was used to create a matrix with required reports along one axis

and dates along the other. Codes were used to indicate who was responsible for report submittal. It should be pointed out that if the report is in a standardized local format, a link to that form could easily be established, using the block containing the report name as the launch point on the page. Further, if the need exists to archive any given report, an interactive database similar to the personnel database could be set up to retrieve data from the users and store it appropriately. As mentioned in Chapter V, these suspense pages were provided in each of the staff section's webs, and a template provided for use at lower levels.

The solution suggested to tackle the G-2's continuous need for publishing unclassified threat and country briefs was the corporate newsletter. As seen in Figure

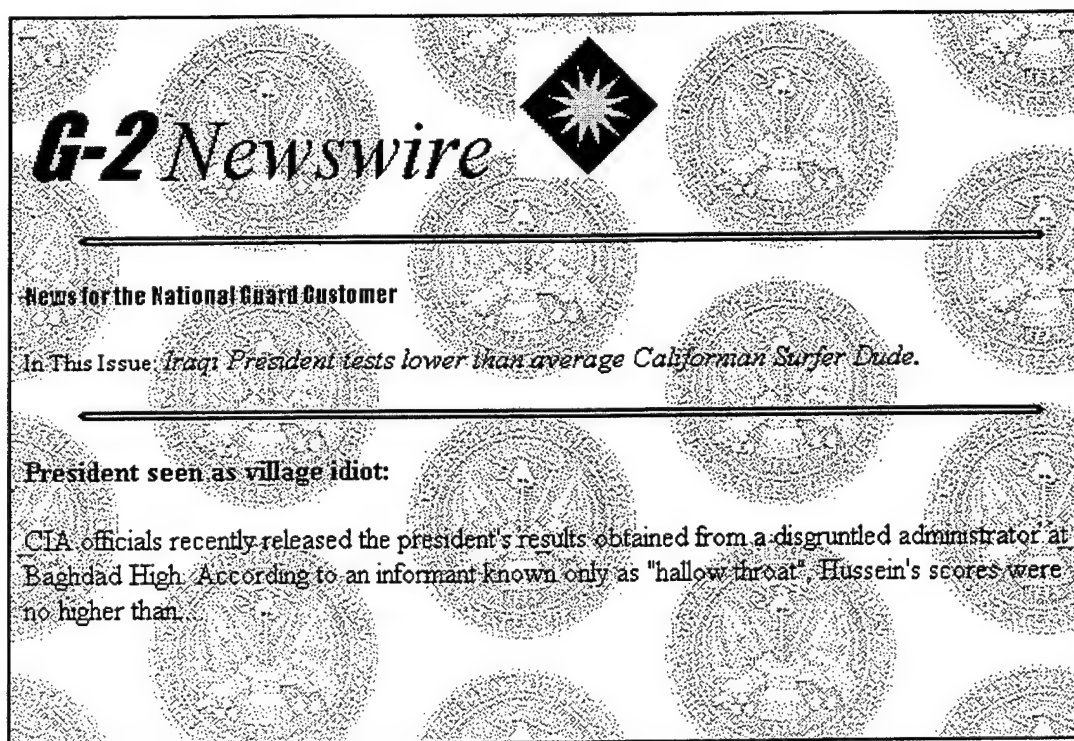


Figure 6.15. Intelligence Newsletter

6.15, a G-2 newsletter was created and saved in HTML format. Using an HTML editor, the G-2 authorized representative can easily update text, photos and links to other sites such as maps, better addressing the perishability of information issues, and reducing time and dollar costs associated with updating and redistribution. Similar sites could be established for fictional threats during staff planning exercises. Password protected versions may prove to be an acceptable means of communicating higher classification briefs.

Like the Form Flow forms generator, the Standard Army Training System (SATS) executable could not be run from within the Web. However, the program CD contained the system's numerous required report formats saved as Microsoft Word templates. By saving these to the web and creating links for the reports, the SATS program could be bypassed and the user could open these formats directly with Word, then manipulate and submit them electronically.

One of the functions requested by the G-3 is expected to become a widely accepted change in current procedures. This function is the Dark Night event-planning page. As discussed in Chapter V, a large number of officers from all levels of command are required to expend massive time and energy conducting coordination prior to any drill period. The commander's letter, depicted in Figure 6.16, contains guidance and planning documents generated by the key staff and commander of a unit. The individual officer within a unit can then browse the pages prior to coordination. Next, the commander and his staff may coordinate either at will or at a pre-designated time using teleconferencing tools.

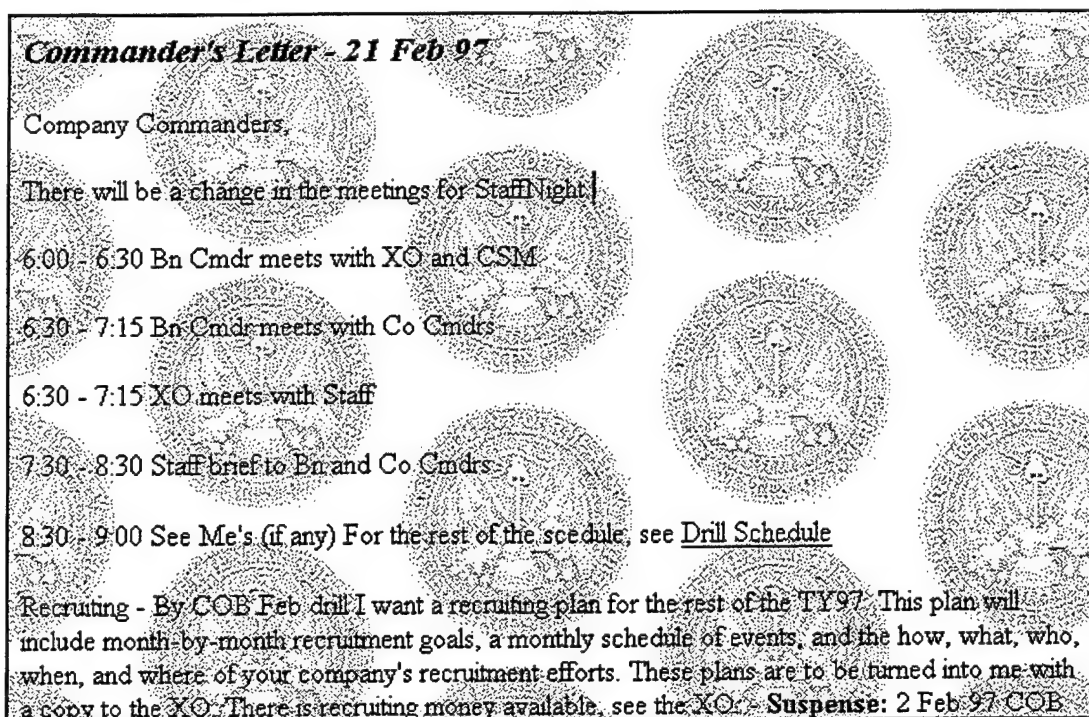


Figure 6.16. Sample Dark Night Page

The tool designed to be run with FrontPage and IIS is a free download program from Microsoft, and is available at the microsoft.com Internet site. Figure 6.17 is a screen shot depicting this tool in use. In addition to standard chat and whiteboard functions, this tool allows document sharing, document collaboration (i.e., shared revising), audio and video. Once a document is tagged by a conference, the document may be revised by anyone assuming control, using the executable from the PC of the person who posted it. The audio is very usable for discussing changes as they are made. The video could be useful, but will slow response time of other features. As mentioned above, this tool is a good alternative to traveling for coordination purposes, and can be used for other event planning and collaboration needs. Additionally, the tool should prove very beneficial in USR report validation/verification, relieving the unit representative from having to travel.

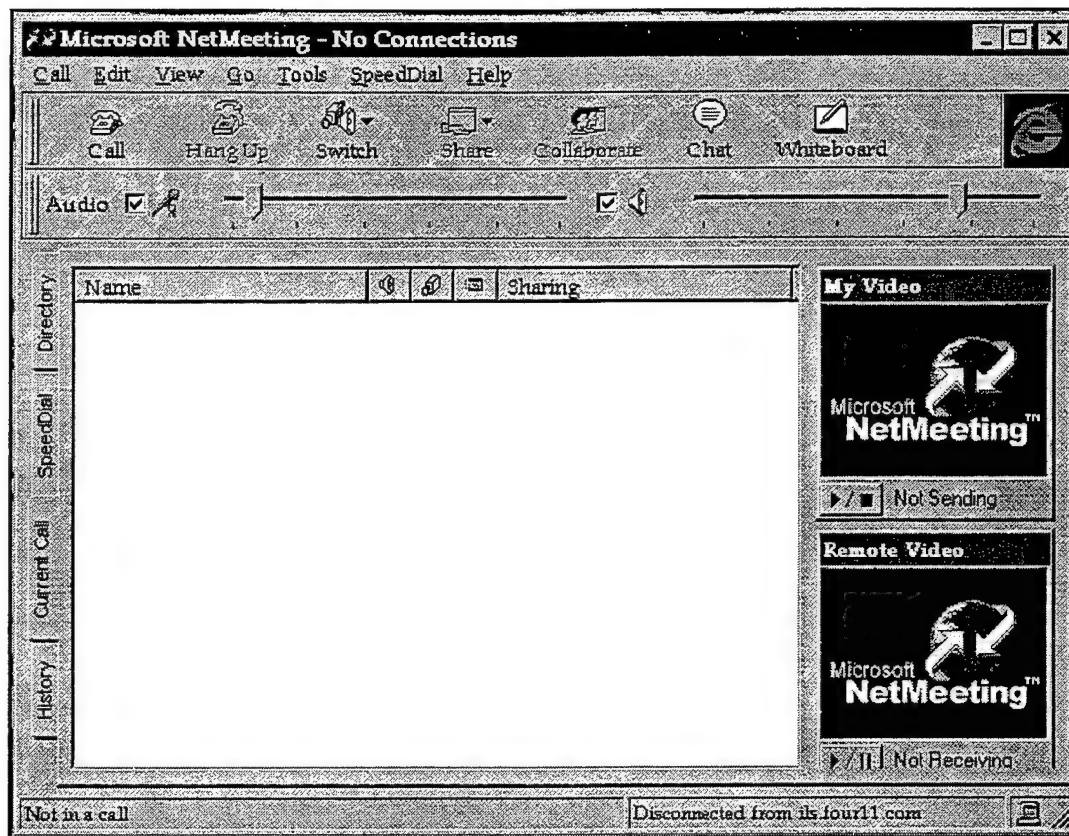


Figure 6.17. NetMeeting

Similar event planning pages were created for the G-4, which should prove useful whether used in conjunction with NetMeeting, or used solely as an information tool.

Since both the G-3 and G-4 are heavily involved in event planning and control, the standard report matrix used throughout the rest of the staff was modified to include action items. Figure 6.18 provides an example of this type of suspense page. Again,

Welcome to the G-4 Suspense page									
	January	February	March	April	May	June	July	August	September
Maintenance report	15th C								
ATD Support Requests due			1st S						
Budget Estimates	15th	15th	15th	15th	15th	15th	15th	15th	15th

Figure 6.18. Report/Action Suspense Page

codes may be used to provide information beyond the action item, and the suspense dates.

Room for a legend is provided at the bottom of the web page.

Figure 6.19 presents the G-4 homepage. The reader's attention is drawn to the table in the center of the page. While suspense and event planning pages have already been discussed, the table also provides the user the opportunity to link to pages

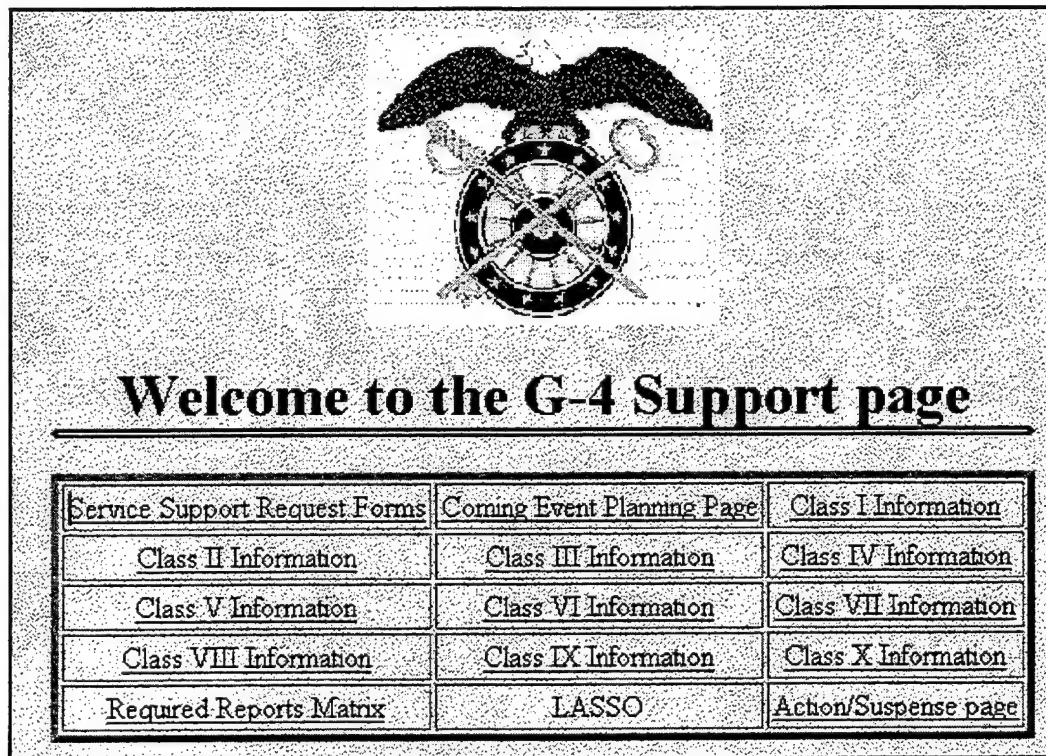


Figure 6.19. G-4 Home Page

concerning various classes of supply. These pages can contain information about how to order the supplies, who will be charged, and planning considerations. The other major link from the table is to the support requests page. On this page, the user will find a list of links to individual support request forms that have been in local use for some time. The prototype team converted these forms into Microsoft Word templates and stored them in the G-4 folder of the Intranet. Figure 6.20 displays how selecting one of these forms causes Word to be launched on the user's PC, immediately opening the required

form for use. This form can then be E-mailed back to the G-4 for action. While an interactive database solution could also have been applied, the G-4 felt the E-mail step provided them the means to authenticate that the person making the request indeed had the power to do so, as the return address would identify them as a key billet holder.

EQUIPMENT SUPPORT REQUEST
Set 40th Div Cr No. 700-39-131

Div Control No. _____

TO: _____ FROM: _____ DATE: _____
 _____ POC: _____
 ATTN: _____ THRU: _____ PHONE: _____

ORIGINAL REQUEST: ☐ YES ☐ NO *NO
 *DATE OF ORIG REQ. _____

CONSOL REQUEST: ☐ YES ☐ NO
 *LIST UNITS. _____

PERIOD EQUIP REQ: TO: _____ FROM: _____
 LOCATION: _____ RETURN DATE(S): _____

PICKUP DATE(S): TO: _____

ITEM NO	LIN	NOMENCLATURE AND QTY	TOT MTGE AUTH	TOT ON HAND	TOT MATES CR-R FI-1	TOT IMC	TOT QTY SHRT	TOT QTY REQD	TOT QTY APVD	TAGEG DEC & QTY
1										
2										
3										
4										
5										
6										
7										

Select a Unit Page to visit:
[40th Division](#)

Figure 6.20. Convoy Request Opened Within Browser

Lastly, the overall design was finalized. Templates were made of home pages, biographies, suspense pages, etc. These pages were then duplicated at the division level as appropriate and a link to these templates was created on the left frame so that subordinate units could gain access as they filled out the skeleton structure already provided them.

E. OPERATIONAL PROTOTYPE

Once the above action was complete, a second structured walkthrough was conducted and the prototype was accepted. As discussed in Chapter IV, this action marked the passing from the initial prototype to the operating prototype phase of the prototype life cycle. Chapter IV also introduced the concept that, unlike traditional software development, Intranet content is constantly evolving. It can be seen, therefore, that this phase represents more than a transition to an operation phase, but instead represents a transition from the prototype development process to the end-user development process.

F. CONCLUSION

The prototype development process defined in Figure 4.2 was followed in developing this Intranet. This method was used both because of the rapid time frame the sponsor desired to work within, and because of the somewhat ill defined requirements. In this instance, the ability to provide a structured walkthrough not only ensured an adequate design, but also really helped to identify the potential the Intranet technology could provide for this unit. The goal of this chapter was to walk the reader through the prototype development process actually followed in creating this Intranet prototype and explain the design and functionality evolution that transpired along the way.

VII. RECOMMENDATIONS FOR INTRANET OPERATIONS

A. INTRODUCTION

The planning and consideration involved in developing and implementing an Intranet is extensive. With no prior experience in developing or implementing Intranets, our research in this area focused on those who have had experience and have shared their lessons learned. This chapter contains two sections. The first section is on Intranet policy, followed by a lessons learned section, which documents and references lessons learned for those organizations that have successfully implemented Intranets. This section includes the author's recommendations, which, given the division's current unique situation, provides the division with next step recommendations for implementing their Intranet.

B. INTRANET POLICY

In order to maintain a disciplined Intranet environment it is absolutely essential the division establish an Intranet policy that will guide and control the division's Intranet efforts. At the time of this writing the Army has not published a policy concerning the management and control of Army Intranets. Appendix 3 contains a 30 October, 1996 letter released by LTG Otto J. Guenther, who is the Army's Director of Information System for Command, Control, Communications, and Computers (DISC4), entitled Guidance for the Management of Army Web sites. Although it does not specifically mention Intranets, much of the guidance set forth in the document is also relevant in an Intranet environment. This document also mentions that a final policy is being coordinated.

1. Security

According to Stephen Cobb, director of special projects at the National Computer Security Association (NCSA), "If you are not ready to write and enforce Web specific security policies, then you are not ready to roll out an Intranet"[7.1]. A formal policy shows that an organization has thought ahead and considered the security issues including, how to combat threats to security and actions to take if security defenses are breached.

Intranet Security can be broken down into two primary areas, content security and access security. Content security concerns the classification level of the information which will be published on the Intranet. Access security is allowing only authorized users (those with a valid login) to be able to access the content on your Intranet. Once on the network, access control can be used to allow only those given permission to access certain pages on the Intranet.

2. Content

What information will be required to be posted on the Intranet? Will there be a standard look (i.e., division symbol on each page, etc.) for each published web page? What will be the size limitation for each web page produced (larger files require longer download times)? What will be the content security classification limitation for web documents posted on the Intranet? Who will be responsible for production of web pages? Who will be given the authorization to identify what will and will not be posted on the Intranet? Who will be ultimately responsible for the content on the Intranet? These are just a few of the many questions, which will have to be addressed in the content portion of the policy document. In order to enforce established guidance and policy in this area,

it is imperative the division also has in place a corresponding mechanism to ensure that members of the division adhere to the written policy. Some other areas, which fall under the content heading, include maintenance and web page posting. Consideration is going to have to be given to how often web pages will be reviewed, updated, and removed. What about the posting of web pages? Will this responsibility rest totally with the division's webmaster?

3. Applications

In-line with the RCAS fielding, the division has established Microsoft Office Pro as the standard office automation suite. The tools operate in a somewhat seamless Windows 95 environment where files are easily shared amongst the different office pro application programs. The Office Pro 97 version gives the user the ability to save documents in HTML format, which makes the publication and posting of web material very simple. The client/server environment was explained in Chapter II. Recall that when the client's browser downloads a specific file type (i.e., .xls file extension, (Microsoft Excel)), in order to view the file on the client machine the application must be installed as a resident program on the client. Policy provisions need to be made as to which file types will be made available for download on the Intranet. The use of Delrina FormFlo is widespread throughout the Army and the 40th Division. A few forms with the .frz extension were included in the prototype to demonstrate the ease and usefulness of the application. The electronic use and processing of Delrina Forms will greatly improve the efficiency in which administrative forms are processed.

With the limited amount of application programs available, consideration needs to be given to the administrators who will be responsible for the production and processing of administrative information.

4. Servers

It is imperative that those responsible in the division for information systems planning understand the short term plans and long term vision of the California National Guard and the RCAS system. In addition, they must understand the DOD IT twenty-one initiatives which includes the Army's Technical Architecture and the information technology standards that are being established. Being able to understand the vision of the state and National Guard bureau and following the standards being established in the RCAS and the ATA will allow the division to better posture itself for receipt of the program-funded RCAS hardware and software components. The state anticipates it will begin receiving RCAS funding support in the 2QTR of FY98.

Recall from the client/server model presented in Chapter II that the web materials (i.e., HTML pages, files of different types, etc.) resides on the server. The division Intranet resides on one machine currently. Will maintaining one server at a single location be practical for the division in the future as the Intranet grows? How many servers are practical, affordable, and reasonable? Does it make sense to have one for every brigade level element? These are the types of questions that the Division Information Management Advisory Council (DIMAC) will eventually have to address. The division has standardized the division's network operating system as Microsoft NT 4.0. NT 4.0 comes bundled with Internet Information Server, which is Microsoft's web server software.

NT Server is one of the compatible operating systems that have been identified in the Army's Technical Architecture and will be the primary server operating system for the RCAS system.

Eventually the division will want to decentralize the content development process. Prior to the decentralization, consideration will have to be given to training qualified personnel (i.e., subordinate unit webmasters) who will be able to prepare and post unit content and coordinate with the division's webmaster.

5. Client

Because of the no-cost download available, the Division Information Management Advisory Council (DIMAC) has decided on Microsoft's Internet Explorer (IE) as the default browser for users on the Division's Intranet. The server-based web content is currently being developed with the assumption that most of the users will be using the freely available IE. Although other browser types can be used, web page appearance will not always be guaranteed unless using IE. Some of the interactive content (i.e., ActiveX, plug-ins, etc.) requires the use of Internet Explorer.

Because access will be limited to the Intranet initially, acceptable usage should not be an issue. When the capability to access the Internet arrives at the division (see RCAS architecture), the division will have to implement policy that indicates what kind of usage is acceptable (i.e., authorized surfing). If the division feels that enforcing policy by tracking visited web sites is a necessity, there are network management tools for sale that allow network administrators the ability to track network client usage of the Internet.

Training is another issue which will have to be addressed by the DIMAC. Although learning and using a browser are easy things to do, consideration still needs to

be given to those personnel in the division who have never been exposed to browsers and the internet. An approach would be to coordinate the development of a New Equipment Training Team (NETT) which could travel to the different units within the division to conduct web browser/Intranet training. A less expensive method would be to take a "Train the trainer" approach. Training packages could be developed and posted on the Intranet. This would be followed by an identification and recruitment of unit level personnel who are computer proficient. The training packages would be thorough enough to provide the trainers with an outline of what material should be covered, along with ideas and teaching techniques that will enforce learning.

C. LESSONS LEARNED AND RECOMMENDATIONS

Although certainly not all encompassing, this section provides the reader with some of the lessons learned by other organizations in the area of Intranet development and operations. The intent of this section is to not only provide the customer with lessons learned, but also to discuss the lessons learned in the context of the division's current situation. The following is a list of eight recommended steps the division should follow in order to achieve success in the early stages of bringing up the Intranet. These steps are not listed in any particular order and are a compilation of the ideas extracted from various Intranet readings. [7.2, 7.3, 7.4, 7.5, 7.6]

1. Responsibility

What may seem obvious in a military environment is not necessarily so. In order for the Intranet development to move forward and progress, responsibility and accountability have to be assigned. Someone in the organization will ultimately have to be the decision-maker when it comes to decisions concerning the Intranet. This person is

the G-6, responsible for information technology management in the division. The G-6's officer representative for automation affairs in the division is the Division Automation Officer (DAMO). The DAMO should be a person who not only has a good understanding of the technology, but, most importantly, has a clear understanding of the division's goals, and is politically up to the task of working with differing personalities and conflicting ideas.[7.2]

The division G-6 should consider establishing a position for the division's webmaster. This position would be a full time job best held by a technically astute senior NCO. This NCO would be responsible for the day to day operations of the Intranet. Written policy, which will be addressed in one of the following steps, will have to address the full scope of the duties and responsibilities associated with being the division's webmaster. It will be extremely important for the division's webmaster to understand the vision and intent of the G-6. The division webmaster will play an integral role in developing the division's policy for Intranet operations as a member of the Division's Information Management Advisory Group (DIMAC).

2. Strategic Level Planning

With the Reserve Component Automation System (RCAS) being implemented throughout the division, it is imperative the DIMAC understand the state's long-range strategic level automation plans. According to the automation representatives at the state's National Guard headquarters in Sacramento, federal funding for the RCAS program is due in the 2nd quarter of FY98. All initiatives being taken now by the division, including the further development and implementation of the Intranet, should be in-line with the state-level vision. This includes those efforts, now ongoing, to posture

the division to receive and integrate the RCAS system into the state's information infrastructure. All the tasks associated with the RCAS posturing, Intranet implementation/operations, and RCAS implementation should be identified. The necessary resources needed to accomplish these tasks also need to be identified. A long-range calendar should be incorporated in the Strategic Plan, which depicts the events associated with the state and division-level vision of what is being planned.

Eventually, the division headquarters (i.e., G-6, DAMO, and division webmaster) is going to want to decentralize Intranet control. This means that tasks such as production and posting of web content and the proliferation and control of subordinate unit web servers will eventually be given to Brigade and below level elements. The impact of the natural decentralization process needs to be considered now so planning for the decentralization can take place. Some of the impact areas which need to be considered in a short-term strategic plan include; identification of pre-Intranet and post-Intranet processes and training for subordinate unit webmasters/system administrators.

3. Intranet Advisory Team [8.3]

The DIMAC is the logical choice to serve as the nucleus for the Intranet advisory team. A user representative from every part of the division, including each echelon from company level up through and including a representative from the state headquarters in Sacramento, needs to be included as a member of this team. It is critical that the Intranet is serves the needs of the user. In order to insure this, the team needs to consist of a representative user base and those with decision authority to enact proposals presented by the team. Initially, the team will have the lone division webmaster. As the Intranet grows, the division will need to decentralize control. Eventually, each Brigade size

element and ultimately each battalion size element will have their own webmaster, and they should be added to the team. Before the decentralization can take place, a disciplined strategic approach addressing the Intranet's development and implementation will have to be developed and disseminated by the DIMAC.

4. Intranet Policy

Section B of this chapter discusses the importance of written policy covering Intranet operations. As mentioned previously, the Army currently has a three-page interim policy letter signed by the DISC4 that discusses Internet web policy. A more formal policy is forthcoming. There are a number of corporations who have put together policy regarding Intranet operations. Unfortunately, they are not as restrictive and disciplined as we believe a military Intranet policy should be. The areas discussed in section B should be researched and discussed thoroughly, with decisions made in these areas published. The military is known for its numerous policy letters, which cover a wide range of operational activities and processes. The development and implementation of an Intranet is no different. The fact that written policy must be developed for the division's new Intranet can not be overstated.

5. Funding

Although web technology is relatively inexpensive, the costs associated with its operation (i.e., servers, authoring tools, client workstations, connectivity, application software, operating system software, etc.) have got to be identified. What resources is the division responsible for? What funding will the state provide for this initiative? What kind of resources will be provided by the federally funded RCAS implementation? These

and questions like them need to be answered in order to adequately plan for and prepare for Intranet resourcing.

6. "Open" Technical Solutions

Those responsible for the hardware and software solutions associated with improving the Intranet's current capabilities should consult the automation professionals at the state headquarters to insure any proposed solutions are in-line and compatible with what future plans call for. According to the state headquarters, the RCAS Program Management Office will begin fielding the system in California.

7. Patience

The division needs to look at the Intranet implementation and operations from a "crawl, walk, run" perspective. The obvious analogy here is the different stages of a child's mobility development (i.e., first a child learns how to crawl, then to walk, then to run).

a. Crawl

Upon our delivery on 2 May, 1997, the division decided to immediately put the prototype on-line. Having just received the operational prototype, the division is in the "crawl" stage and will have to spend some time finishing the initial development. The prototype contains both static and dynamic (i.e., data entry pages working with a back end database) pages. The static pages that were created contain some worthwhile information, which, of course, will have to be periodically updated. The dynamic pages, specifically the soldier data entry forms using the Open Data Base Connectivity (ODBC) standard to store, retrieve, and query records in a web environment, were developed to show what functionality is available. The team

recommends the division continue to maintain the static information but disable the ODBC portions of the web site until the DIMAC can conduct a study to identify what data entry, retrieval, and query systems will be developed or incorporated into the Intranet. Before the division starts using the Intranet for storing and retrieving vital data, the security aspects of the system will have to be addressed in detail. What the division does not want is to put itself in a position with the Intranet where sensitive data (i.e., personnel information, etc.) could be accessed without authorization, compromised, or corrupted. Each case where there is a desire to use the ODBC functionality and incorporate data storage and retrieval will have to be looked at on an individual basis. Disciplined policy and procedures will have to be enacted which discuss access security, storage, back-ups, data recovery, etc. What current database information in the division can be ported over to the Intranet to make this data readily available throughout the division? Is this kind of thinking in line with what the state and the RCAS system will provide the division? Is it worth the time and resources now to look at the legacy data storage and retrieval systems and how feasible would it be to port that data over to the Intranet? Is the new RCAS system going to contain web enabled applications, which will provide this functionality? These and many other similar questions will have to be studied and addressed by the DIMAC before databases are incorporated into the Intranet. During the "crawl" stage, the division should be promoting and selling the usefulness of the Intranet. In order to make it useful, the information must be timely and informative. Current division news, unit news, training schedules, division calendars, downloadable forms, briefings, spreadsheets, etc. are just some of the static information the division can be providing its users. Marketing the Intranet at this stage is very important to eventual

success. The word has to be put out to all soldiers in the division that this service is available. Instructions should accompany the division-wide announcement on how individuals can obtain accounts. All members of the division should consider the Intranet "their" Intranet and their primary source of division-wide information.

b. Walk

With the Intranet on-line and the division wanting the utility of the Intranet to increase, the G-6, the DAMO, and the DIMAC certainly have their work cut out. One of the first concerns that will have to be addressed is the traffic load dialing into the division's modem bank to gain access to the Intranet. The division currently has only ten 1-800 lines and approximately 250 authorized users with assigned logins and this number is growing. It is just a matter of time before the 10 lines will reach a point of saturation and all a user will hear when he dials in to the division's modem bank is a busy signal, which can lead to discouragement rather quickly and cause people to discredit the Intranet. A modem ratio is the number of registered users to the total number of modems in the modem bank. Internet Service Providers (ISP) know it is time to add more phone lines/modems when they receive complaints about busy signals. To many U.S. providers, the modem ratio is proprietary information they do not wish to share. Those touting a no busy signal guarantee usually listed figures ranging from 10:1 to 15:1. The first case represents 10 registered users to every 1 modem in the modem bank. It can be seen that with 250 registered users and only 10 available phone line/modems, the divisions modem ratio is already at 25:1. The DIMAC should consider when and how they would expand the current 10 line/modem capability. This is an area which the division will have to keep

an eye on very closely in order to provide the best possible service to Intranet users and promote Intranet use.

Education and training are other areas the DIMAC will have to address. Deciding who will train, how, and what they will train are probably the biggest questions that need to be wrestled with in the short term.

Also, understanding the state's long term plan for information operations (i.e., RCAS, use of legacy systems, data usage, etc.) is critical for the DIMAC. Before any Intranet expansion occurs (i.e., the purchase of additional servers, applications, modems, phone lines, etc.), the division should draft proposals to the state national guard bureau to ensure that the proposed Intranet expansion is in-line with the state's long term information operations vision.

Dynamic web capabilities offer a powerful tool to the division. The ability to enter, retrieve, and query information from a database gives the division a decision support capability. Information can be put literally at the fingertips of decision-makers authorized to access and query databases for the specific data they are looking for. Databases of different types are currently maintained such areas as personnel, security, operations, and logistics. Recommend that the DIMAC prioritize the areas which would benefit the most by the development and implementation of a web based dynamic environment where records can be queried, added to, updated, and deleted from dedicated databases. As mentioned previously, the DIMAC will have to scrutinize each dynamic area developed in order to ensure the safeguard of sensitive data. Once developed and approved for implementation into the Intranet, only one dynamic area at a time should be implemented. It is recommended that a simple area be developed initially.

Redundancy and fault tolerance need to be built into the implementation plan as a safeguard measure.

c. Run

The division is going to want to decentralize the Intranet. Currently, the division's Intranet is operating from one server machine with a couple of soldiers playing the part of interim webmasters. Eventually, the Brigades and possibly the battalions will want to maintain their own web servers. Given authorization, brigade and battalion level webmasters can update information on the lone division server. This process, however, can be slow and cumbersome and opens up the division server to unnecessary and potentially dangerous access. With the growth of the Intranet, entity sites (i.e., brigade and battalions) are easier to maintain with their own resident server. Given their own server, webmasters at the brigade and battalion levels will better be able to manage their own sites.

In order to decentralize the Intranet, the division is going to have to provide its subordinate brigades with the necessary resources (i.e., server, web development tools, training for webmasters, etc.).

The addition of dynamic areas will continue in the run phase.

8. Intranet Promotion [7.4]

In order for the Intranet to be successful, it has to be valued as useful by its users. If content is not kept up to date, users will seek other, more reliable forms of information. If the Intranet is providing useful information to the division's users, it should be promoted from the top. The Commanding General, the Assistant Division Commanders, the Division Sergeant Major, the Chief of Staff and the rest of the leadership in the

division should play an active role in promoting the use and gradual development and improvement of the Intranet.

D. CONCLUSION

The division Intranet is new and the information operations associated with the Intranet are new as well. Information technology has changed the way we work and unless the division embraces the Intranet and addresses the difficulties associated with "change" in the work place, the Intranet runs the risk of being discredited or, even worse, dying an early death. This chapter discussed Intranet policy and lessons learned and hopefully has given the division some ideas on how to successfully implement their Intranet.

APPENDIX A. TRIP REPORT 1

Trip Report -Visit to California National Guard 40th Division Headquarters - Cypress California - 19 Dec. 1996

We met with LTC Rod Barham, the 240th Signal Battalion Commander for the 40th Infantry Division (Mechanized) around 10:00 AM, 19 Dec., at the 40th Division Headquarters located in Cypress California. LTC Barham is the Division Automation Officer (DAMO) responsible for the operation and maintenance of all automation equipment within the division.

MAJ Heckroth and I put together a briefing to guide us through our initial meeting with LTC Barham. Our intent was to follow the content of our briefing, which includes our project's scope, goals, and objectives. The briefing concludes with a student checklist that we put together to insure we had the information we needed for the next phase of our project.

LTC Barham also prepared a briefing that gave us an initiation into the automation situation within the division. In order to get better acquainted, we shared our military experience backgrounds with LTC Barham and he gave us a brief background on his military service experience.

LTC Barham spent eight years in the Pentagon at the National Guard Bureau. His position at the Bureau was as an Information Systems Manager/Developer. He later spent some time as an automation professional at the Program Executive Office (PEO) for Standardized Army Management Information Systems (STAMIS). LTC Barham said he was very familiar with the now defunct Reserve Component Automation System

(RCAS). He said the 1.5 billion dollar program, which ran on a UNIX platform in a client server environment, was a multilevel security system that was proprietary in nature, very cumbersome and not an intuitive system for new users. The system, which was to improve readiness by providing digital connectivity to geographically dispersed National Guard units, was scrapped only twelve months ago after an outlay of nearly 2 billion dollars.

The California National Guard was the first unit to field the "old" RCAS system. LTC Barham informed us that they (California) would be the last to field the "new" RCAS system because of their high priority in the initial fielding. The California National Guard is not due to receive their "new" RCAS system until the year 2002.

LTC Barham, as the Division's senior signal officer and automation officer, was tasked to come up with an interim system that would provide the division with a digital messaging capability with connectivity to all the division's subordinate elements. In addition to a digital messaging capability, the division specified a general requirement of having the capability to share data. LTC Barham's briefing was the same briefing he had given to the division's Chief of Staff and specified his short, medium, and long term objectives for the division in the area of automation.

He mentioned that his number one short-term objective was to give the division its own electronic mail (e-mail) capability. At present, soldiers within the division that want to conduct National Guard business (i.e., coordination, information dissemination, control, etc.) using electronic mail, do it at their own expense (using a local or national Internet Service Provider (ISP) mail server).

LTC Barham is in the process of setting up what he is calling the Division Bulletin Board Service (BBS). Following our morning meeting with LTC Barham, we met with SSG Gregory Holmes, an NCO from the Division Material Management Center's (DMMC) Logistics Automation Service Support Office (LASSO), who has volunteered his services in setting up the Division's initial BBS/email capability.

Our meeting with LTC Barham lasted nearly three hours. Our discussion covered a wide area of topics. The following areas of discussion are worthy of further mention:

- **User Survey** - We showed him an example of a survey that could be distributed throughout the division to collect information with regard to user's wants and needs. He was extremely interested in possibly modifying the questionnaire and distributing it throughout the division in order to "check the pulse" of the division. MAJ Heckroth and MAJ Olson thought this would be a good idea. LTC Barham has "got the ball" on the user survey.
- **"As-Is" System** - LTC Barham was interested in coming up with an "as-is" IDEF model similar to the Data Flow Diagrams (DFDs) we put together for our IS4200 projects. The "as-is" system would depict garrison information flow within the division.
- **Operational Concept** - The new "BBS" system the division is bringing on-line will need to be maintained (i.e., system administered to add, update, and delete users). When the proposed webserver is brought on-line, policy and guidance (i.e., an SOP) is going to have to be provided to website content providers in order to insure that only standard, disciplined, and useful content reflecting the pride of the Division is allowed to be published. All meeting participants felt this was a critical component in order to maintain discipline and control of the internal website.
- **Current Vision** - LTC Barham's short-term vision is bringing up his "BBS" as soon as possible and giving each HQs element, from division through company level, an email account. In addition, each primary division staff element would be given an email account. According to SSG Holmes, the initial BBS will consist of a standard telephone line, which terminates into a ring of eight modems. The "BBS" hardware platform is a 166MHZ Pentium Gateway Computer. The "BBS" server software is called TSX-Online. TSX is a stand-alone operating system, which also has Internet Service Provider (ISP) software functionality, which provides the Division's dial-in users with a gateway to its mail server (a TSX utility) and web server (Internet

Information Server IIS, a Microsoft product). This product is to be used as a gateway, with a parallel machine(s) running applications in an NT environment.

- **Key Question** - One of the key questions that was discussed with Barham and Holmes is connectivity. If each HQs element, from division down to company level, plus each primary staffer at Division is given an email account and each of these mentioned entities checks their mail three times a day, is eight modems enough to provide quality service (no busy signals when ISP is called to download mail)? There is nothing more frustrating than trying to gain access to a dial-in host computer and receiving a busy signal. Physical connectivity was also an issue of discussion. According to Barham and Holmes, the location of the initial BBS will be established at the Division Support Command's (DISCOM) Logistical Automation System Support Office (LASSO) located at 3700 East Spring Street, Long Beach, CA. Those Division elements that are co-located with the Division LASSO will have direct connectivity to the mailserver and webserver via local area network. Others will have to dial-in to the server or have a dedicated line to the LASSO's location. The concerns over traffic volume are magnified with the addition of the webserver to the network. (users stay connected while "surfing" vice mail upload/download then dropping connection). Discussion leaned toward a traffic volume study that would give the division an indication of the number of dial-in modems and direct connect lines they would need to provide quality service to its customers.
- **Administrative Forms** - A separate problem, but one LTC Barham would like to address, is the idea of getting frequently used administrative forms on-line in a distributed environment so they can be accessed by division personnel. He mentioned programs (ProForms and Forms Engines) that are currently used in the Army for electronic preparation and transmission of admin forms.
- **Information Modernization Plan** - LTC Barham is currently writing the 40th Division's Information Modernization Plan. He gave us a copy of the National Guard's 1995 Modernization Plan he published while an Information Officer at the Pentagon.
- **Prototype Discussion** - In an attempt to scope our project prototype, we asked LTC Barham for a vision of what he considered potential areas for initial development of both static and dynamic web pages. He said that there are three primary critical information areas that we could incorporate in a web prototype. They are readiness, USR reporting, and training schedules. In reference to training schedules, LTC Barham mentioned that there is an active Army training scheduler currently in use. He told us that he would try to get some additional information on the program. We told LTC Barham and SSG

Holmes that we would pursue the design and development of a dynamic prototype in this area. We also agreed to come up with a group of static pages that would provide a hierarchical shell, beginning with a division homepage, with links to each division staff element and each of the Brigades and separate Battalions (i.e., Air Defense, Signal, Engineers, etc.).

- **Student Information Requirements** - Information LTC Barham agreed to provide students:
- Division Organization Chart with locations of units down to the company level
- Executive Summary of "old" and "new" RCAS systems
- Information on how the Guard does business in the three critical information areas: readiness, USR reporting, and training schedules. In order to develop databases and dynamic web pages that will allow a user to input, update, and query information, the developers will need all the forms (which contain database fields information) that are currently used in reporting and processing information in these areas.
- Results from previous survey and decision whether to go ahead with new unit's requirements survey
- As much "As-Is" system information that you can possibly get your hands on. This is critical in order to put together a quality "As-Is" IDEF model.
- **Public Affairs Opportunities** - LTC Barham mentioned that he wanted to capitalize on the public affairs opportunities that will present themselves in this project. The students agreed they would participate to whatever degree the LTC felt was appropriate.
- **Ground Rules** - LTC Barham said the only ground rule he has is that we let him review any published documents for suitable National Guard content.

APPENDIX B. TRIP REPORT 2

Visit to California National Guard 40th Division Headquarters- Cypress, California- 28 Feb 1997

This is the second in a series of trip reports. We linked up with LTC Scott, the Division G-6/Garrison Commander, at around 08:15. The NPS thesis team of MAJ Tom Heckroth, USMC and MAJ Tom Olson, USA had made prior coordination with LTC Scott to meet with representatives from each of the G-shops to give them an Intranet demonstration and to gather requirements. We had the pleasure of meeting the Division's Chief of Staff, Colonel Combs, and the Commanding General for the 40th Division, Brigadier General Edmund C. Zysk before the day's meetings began.

During our discussions with Colonel Combs, we discussed our intent to recruit two more thesis students from NPS that would follow-on and continue to build the Division's Intranet. An excellent opportunity exists to build a habitual relationship between the systems management department at NPS and the 40th Division, which comprises 80% of the California National Guard. We felt it was a good time to bring up the funding issue. MAJ Heckroth and I personally funded the two-day trip to Cypress in December 1996. We did receive funding from NPS for this trip. Future trips will have to be personally funded by the students unless a sponsor steps forward to help defer costs. There are other areas where financial support is critical in order for NPS to continue to support the Intranet system development. One of these areas is equipment support. The development team is currently using one machine that is on loan and could be taken from the team on a moment's notice. The team is asking for the funding to purchase two

200MHZ Pentium pro systems that will serve as their development platforms. In addition, the team will need two copies of Microsoft Windows NT 4.0. The new machines will greatly increase the productivity of the development team. The job of recruiting and securing follow-on students will also be made easier if prospective thesis students know they have guaranteed production resources to help them complete their thesis. We feel that without adequate resource support in the future, our production capabilities and development productivity will be severely degraded. We look forward to further discussions with the division concerning the necessary resource funding.

We linked up with our sponsor, LTC Rod Barham, Commander of the 240th Signal Battalion, at around 08:45. We retired to the Division's conference room to brief our sponsor on what we had accomplished since our last meeting on 19 December 1996.

Our intent for this trip was to get back together with our sponsor (customer) to make sure the work we had done was in line with his expectations and vision and also to collect further guidance and requirements.

We discussed with LTC Barham the intent of our visit and set up our notebook computer to give LTC Barham a demonstration of the work we have done since December. The team told LTC Barham how we felt we had lost about thirty days learning the development tools (Microsoft Internet Information Server (IIS 3.0), Microsoft FrontPage, and Microsoft NT Server) the division has established as their standard tools. Back in December, the team opted to learn and use the tools the division was using. We decided that if the division wants to keep and implement the student's prototype at the end of the project, they could port the work over to a system using the same tools, thus eliminating any compatibility problems.

As mentioned earlier, advance coordination was made by the team to meet with each of the division headquarters G sections to demonstrate our work to date and discuss with each section their potential web content. The intent was to explain the purpose of the Division's Intranet, give the demo, and discuss requirements, wants, and needs.

LTC Barham and MAJ Willand, the headquarters Commandant, received the first of five demos we gave throughout the day. MAJ Willand, who is also an automator and does a lot of briefing preparation and graphic design work for the division headquarters (copy of division's 80th Anniversary program enclosed for thesis advisor Suresh Sridar) lent us an external monitor for the day's demos. MAJ Willand told the team he would provide us with digital copies of pictures of the commanders and primary staff to incorporate into the division's Intranet. Unfortunately, the team failed to get back with MAJ Willand to secure the digital copies prior to our departure from division headquarters. The team will coordinate with MAJ Willand for electronic transfer of the information.

In our discussion with the G3, his initial concerns were with the security aspects of the system. Informing him that there would be no classified message traffic permitted on the system, he was still concerned about the compromise of privacy act information (i.e., social security numbers). We assured him that the system is an internal (Intranet) network that will be accessible only to authorized users. Only a certain number of the authorized users will be given access permission to personnel records for the purpose of maintaining those records.

The G3 asked where, in relation to the SIDPERS database (U.S. Army's personnel

database), will the new Intranet system fit in? His concern is that with the introduction of this new system, which is tracking similar data, twice as much time will be spent entering the same data. LTC Barham made the point that because SIDPERS is a higher headquarters information system, it is a political football that needs to be treated with kid gloves. All the discussion participants expressed their frustration with the current SIDPERS system and its inability to provide the division with timely, updated, and accurate data.

Discussion turned to training and training schedules. We showed the G3 the demo copy of the training schedule that we put together. The point was made that not only the G3 but the division as a whole (G1-G6) really needs an all encompassing calendar that would be useful in tracking and resolving activities within the division. We noticed that Calendar Creator Plus, a software calendar tool, was in widespread use throughout the division headquarters. The development team will check with the vendor to see if the newest version of the software is hypertext mark-up language (HTML) compliant, which will enable the calendars to be posted to the Intranet. Someone mentioned how useful it would be to "drill down" to a battalion's page and see what kind of upcoming events they had on their battalion calendar.

SGM DeAmicis gave the team a CD copy of the Standard Army Training System V4.0. He mentioned that V4.1 was just released or is due to be released shortly. The team will inquire with the program's developer on version V4. 1 and will look into how this program can be incorporated into the Intranet.

The G-3 inquired about a system "chat" capability where users could conduct real time interactive text transmissions over the network. He mentioned that he currently

conducts chat sessions with members of his G-3 staff to conduct remote planning sessions. The idea evolved out of the need to conduct "dark night" planning sessions, where commanders and staffs traditionally would have to travel to a meeting place to conduct planning for upcoming guard training weekends. The remote chat sessions allow the commanders and staffs the convenience of remaining geographically dispersed and conducting their planning sessions on-line. Microsoft NT Server v4.0 with service pack 2, which will reside on the division's Intranet server, comes bundled with a program called NetMeeting. The team has not had the opportunity to look into the program's capabilities/limitations but understands the program has both a "chat" and "whiteboard" capability.

Potential content areas for the G-3 include posting areas for exercise operations orders (OPORDS) and fragmentary orders (FRAGOS).

The capability to scrub the Unit Status Report (USR) at each echelon level, from company through division, was discussed. The team expressed the need to better understand the USR process so that we could better understand how the USR process could be improved through the use of the Intranet.

MAJ Russ Garner, a member of the G-3's staff and the division's USR responsible officer, was brought into the meeting to discuss the USR process and how the process could be simplified through the use of an Intranet. MAJ Garner mentioned that it would be nice to have a dynamic copy of the USR data that could be manipulated at each echelon level. MAJ Garner provided the team with an electronic copy of the new AR 220-1, the regulation covering the USR. MAJ Garner also provided hard copy templates of the USR report.

MAJ Bruce Shrewsberry, representing the G-1, works with Russ Garner, playing a major role in the USR process. MAJ Shrewsberry draws personnel information from the SIDPERS database and consolidates battalion size and separate company personnel information. MAJ Shrewsberry puts together the division's master report, which shows the results and rank orders the 23 battalions and 16 separate companies in 9 personnel readiness categories. MAJ Shrewsberry gave us an electronic copy of his most recent master report to publish and include in the prototype. MAJ Shrewsberry brought up some ideas in reference to G-4 related applications and thought that it would be nice to integrate some of the G-4 related processes (i.e., lateral transfers of equipment, etc.). We told MAJ Shrewsberry that we had stayed away from anything G-4 related because the Logistics Automation System Support Office (LASSO), which is an office of four automators, is currently working to integrate their automated system into this Intranet environment. In later discussions with the G-4, it was determined that it would be beneficial to incorporate some G-4 related material apart from the development being done by the LASSO.

Three other ideas came out of our discussions with MAJ Garner and MAJ Shrewsberry. One was the idea of a suspense page under each G section. This would allow the G sections to post ongoing suspenses for the division. Another idea was to have a page under each G section that would indicate the submission frequency of all required reports. The third idea was to have a telephone book section under each entity section. All three are easy to implement and will be included in the developing prototype. LTC Barham mentioned that his battalion is currently working on a phone book for the division. We will look to LTC Barham to populate the phone book portions of the

prototype.

We gave our presentation to MAJ Dimunyat, SFC Oehmen, and SFC Smith from the G-2 section. They mentioned that their primary battlefield information systems include the All Sources Analysis System (ASAS) Warrior and MSCIMP Beta. We later received a demo from them on their ASAS Warrior system. We told them that the Intranet would be a system apart from their battlefield information systems. Some ideas for the use of the Intranet system include a page for routine security messages, a page for a G-2 newsletter, a page for Intelligence Summaries (INTSUMs), and a page for weekly threat updates.

MAJ Dimunyat said that he is often asked how many Intel soldiers there are and where they are located throughout the division. With a divisional relational database, MAJ Dimunyat could query this information (i.e., MOS=96B) and get a return listing of all his Intel soldiers in the division and where they are located. All this is possible in the proposed personnel database.

We met with MAJ Jose Coito, S-3 240th Signal Battalion over lunch. From the team's perspective, one of the most critical pieces to the division's new Intranet will be the development, dissemination, and implementation of policy for the new system. MAJ Coito said that as the new system's proponent for the Division, the 240th would look into the policy aspect of the new system. The thesis team is also looking into developing draft policy for the new system, especially as relates to content context. MAJ Coito reiterated that his battalion was working on developing the Division's phone book which, when put together, could be ported to the prototype.

We met with representatives MAJ Dennis Davis and SFC Fuller from the G-4

section in the afternoon. We told them how we had not done any work to date with G-4 related information due to the LASSO section working on porting logistics related information systems over to the Intranet.

MAJ Davis said that he could break his shop into 4 entity areas: supply (X classes), transportation, maintenance, and, services. Information pages for each of these areas will be established on the prototype, along with a link to the LASSO's work. SFC Fuller provided the team with several service request forms to integrate into the prototype.

MAJ Davis mentioned that having electronic mail in order to transmit and receive action items would be very beneficial. He also said that controlling who (authorization to a limited number of users) could submit action items and who would be able to track (who submitted what, when) those actions through an audit trail would be a critical component.

Electronic mail will be another service that will be made available with the implementation of the new Intranet system. Most of MAJ Davis' concerns will have to be addressed in policy and procedural documentation and by the introduction of e-mail to the division.

Our last meeting of the day was with CPT Rebman, who is part of a ten man 5th Army advisor group. He mentioned how the Intranet would be a useful medium for posting advisor-related information. I told him we would establish pages and links for the Army advisor group at the Division level and at each one of the maneuver brigade sites.

We met with our sponsor, LTC Barham, briefly before departing the division area. We told him we had gathered a lot of good information and would put together a

trip report of the day's events. In our initial meeting back in December, LTC Barham identified three primary focus areas: readiness, USR, and training schedules. The readiness focus area and USR focus area overlap. With the USR process, the team needs to educate itself on the process before we can indicate how this area will be implemented in the Intranet environment. The production of a static master report is in the "easy to do" category. How to implement the rest of the USR process will take some education and work on the part of the development team. The training schedule focus will be expanded into an organization event calendar that will include the major events at each echelon (i.e., Division, Brigade, Battalion, etc.). There were a number of requirements/wants/wishes that fell into the "easy to do" category (i.e., phonebook pages, completed master report, digital images of commanders and staffs, etc.). Even the event calendars should not be too difficult. The three "long poles" in planning the next steps for development will be:

- once the team becomes educated in the USR process, determining how the process can be simplified through the use of the Intranet
- the development of a division-wide relational database that will be the source of timely and accurate information for authorized users
- the development of the Division's Intranet system policy. The system's policy has got to be an all encompassing document that covers every operational and procedural aspect of the system

This concludes trip report #2. At present, the thesis team anticipates two more visits to the division headquarters before we begin our write up.

APPENDIX C. DESCRIPTION OF MAJOR REQUIREMENTS

I. Basic Intranet Design From A Divisional Viewpoint

In order to bring the Division's Intranet to life, we had to give it structure. The Division's Intranet structure replicates the hierarchical command structure of the division and is the "skeleton" on which the rest of the Intranet resides.

- **Entities affected:** All 13,579 soldiers currently assigned to the division will be affected.
- **Number of users:** Potentially all 13,579 soldiers in the division will be users
- **Primary Owner:** The division commander would ultimately be responsible for giving the authority to implement the new division Intranet. His G-6 staff officer would oversee the strategic level planning, implementation, and execution of the system. The day-to-day operational duties (adding, modifying, and deleting division level content, overseeing the content postings of subordinate units, etc) would be done by a dedicated webmaster (still to be determined).
- **Frequency of use:** continuous
- **Frequency of update:** daily
- **Mode of use by entities:** All 23 subordinate battalions and 18 separate companies/detachments will maintain their own portions of the division Intranet. Password access to modify each of the 41 "subwebs" will be given to battalion and company/detachments by the division's webmaster. This will require each battalion and company/detachment to have its own responsible webmaster.
- **Types of information:** Unclassified information of all types is planned for the system. Unclassified but sensitive (i.e., social security numbers) and classified (i.e., Unit Status Reporting) material will be considered in a closed network context.
- **Source of information:** The sources of information run the gamut, from policies at the division level, through each entity level, all the way down to the company/detachment level. Reports at all levels are targets for consideration. Database information from the existing Standard Installation/Division

Personnel System (SIDPERS) will also be a source. Requests for administrative action or support are equally viable sources of content.

- **Current Status:** The division is partly automated in that it uses automated software programs like word processors, spreadsheets, and standalone databases to assist in completing administrative tasks. They have just completed the installation of ten dedicated 1-800 lines and have reached initial operational capability (IOC) as a fully capable Internet service provider (ISP).
- **Miscellaneous information:** The primary benefit this system provides the division with is the capability to widely disseminate timely information over a very broad geographic (5 state) area.
- While on-site personnel were deep into planning access to automated logistics support via the proposed Intranet, no overall design incorporating access and potential content for the division staff and subordinate commands were being addressed.

II. An interactive administrative/personnel database

The division's current system of tracking personnel information is called the Standard Installation/ Division Personnel System also known as SIDPERS. The California National Guard runs its own variant of the SIDPERS system that was developed for the active component.

A California National Guard recruiter enters a soldier's personnel information into the system upon his/her entry into the guard. Subsequent entries or changes to the individual's personnel data are done through a very antiquated process of mailing the source documents (promotion orders, copy of marriage certificates, etc.) to the Office of The Adjutant General (OTAG) in Sacramento, CA. Division personnel we spoke with who work with the SIDPERS system say that the system is never updated in a timely manner and continuously reflects inaccurate data. Another drawback of the system is that it has a very limited querying capability.

LTC Barham mentioned that the need exists to maintain a personnel database that could reflect timely and accurate information. The Office of The Adjutant General (OTAG) is currently conducting a test case with one of the division's battalions. The test gives the battalion the ability to directly input and change information in the SIDPERS system. Beginning in October of 1997, implementation of this capability will begin at all the battalions in the division. This initiative will certainly improve the accuracy and timeliness of the information. The query limitation, unfortunately, will still be present. We have put together a dynamic web-based prototype which illustrates for the division the power and usefulness of a queryable database. If the division were to choose to refine the prototype so it is more robust, it should be done in a manner in which the information from the SIDPERS database could be imported directly into the division's personnel database, and updated periodically.

- **Entities affected:** Hundreds of command and staff personnel would be affected with the increased capability to query any personnel related fields. The improved capability would bring to bear more informed and timelier decisions.
- **Number of users:** Hundreds of S-1 personnel would be the primary users, but others could also use it if provided access.
- **Primary Owner:** The division's G-1 would be the primary owner of the system.
- **Frequency of use:** continuous use on a daily basis
- **Frequency of update:** daily
- **Mode of use by entities:** Update capability will have to be limited to a select few to insure integrity of the database. Daily backups will also be a critical part of the system's operation.

- **Type of information:** In the closed Intranet scenario, the use of sensitive but unclassified traffic (i.e., use of SSNs) will be prevalent. Personnel data will not exceed the sensitive but unclassified security level.
- **Source of information:** Ideally, the division wants to replicate the data that is tracked in the SIDPERS database. The major limitation with SIDPERS is its limited query capability. The hope is that we will be able to import records from the SIDPERS database directly into a web accessible Access database.
- **Current Status:** SIDPERS is the standard and will continue to be the standard until an Army wide system replaces it. Moving input/update authority to the battalion level will, without a doubt, improve the timeliness and accuracy of the data reflected. The query limitations are real. The ability to retrieve traceable information beyond the query capability of the SIDPERS system is all done manually.
- **Miscellaneous information:** The ability to import SIDPERS records into a division-managed database needs to be explored. A web-based, division managed database will provide the command with timely and queryable personnel information.

III. Readiness Reporting

From a requirements perspective, our customer wanted us to study how we could simplify the readiness reporting process. In accordance with Army Regulation (AR) 220-1, Unit Status Reporting, each battalion (23 in the division) and separate company (18 in the division) must complete this lengthy report. With worksheets, the report (DA FORM 2715-R) is thirty-one pages long. The report is classified confidential when filled in. Enclosure 6 depicts the current process in DFD format.

In accordance with AR 220-1, all Army National Guard and Army Reserve Units must submit a completed Unit Status Report every quarter. According to one battalion commander, organizations spend about a month preparing and gathering the information they need in order to prepare the report. Once completed at the battalion (23) and separate company level (18), a representative from each of these entities travels with the

completed report to the division headquarters in Los Alamitos, CA. Once there, the reports are reviewed by the division's USR responsible officer for completeness. A representative from the OTAG (the 40th division's higher headquarters) in Sacramento travels to the USR quarterly turn-in and collects the data from all the submitted reports. This representative currently uses a software program to enter and store the collected information. This data is later sent to the National Guard Bureau in Washington, D.C., via electronic means.

The master report is a personnel focused readiness report that is prepared by the Division readiness office (DRO). Information for this report is taken directly from the SIDPERS database by the DRO. Even though all the information for the master report is taken from the SIDPERS database, commanders of the twenty-three battalions and eighteen separate companies are required to send master report information up through their command channels. The battalions and companies have different methods for acquiring this information from their subordinate entities (i.e., companies and platoons). LTC Rod Barham uses a Microsoft Excel spreadsheet that he sends to his subordinate commanders as an attached Multipurpose Internet Mail Extension (MIME) file to an ordinary e-mail message. Upon completing their portion of the spreadsheet, they e-mail it to LTC Barham, who in-turn submits the consolidated information to his higher level commander. LTC Barham's model can be adjusted for use at any command. The division uses a Master Report, which can just as easily be adapted for use by other commands.

- **Entities affected:** Literally hundreds of people would be impacted by the introduction of a web-based Unit Status Reporting system. Travel for the forty plus personnel who travel to Los Alamitos every quarter could be eliminated

resulting in a significant cost saving to the division. Working copies of the report could be passed back and forth electronically via electronic mail until the division readiness office was satisfied with subordinate entities final products.

- **Number of users:** Every person in the division directly involved in division readiness reporting would be involved. Estimate of 100 personnel.
- **Primary Owner:** The Division readiness office
- **Frequency of use:** daily
- **Frequency of update:** the draft USR reports could be passed back and forth as necessary
- **Mode of use by entities:** multiple update
- **Type of information:** The USR is classified confidential when it is filled in. The master report is an unclassified document. LTC Barham's report is also an unclassified document.
- **Source of information:** Army Regulation 220-1: Unit Status Reporting and the division's master report
- **Current Status:** Processes are explained in paragraph above
- **Miscellaneous information:** The requirement from the division readiness office is to have a dynamic copy capability where a subordinate entity could download a blank report, fill it out and send it back to the DRO for review. The DRO could then either accept the report or send it back to the submitting entity with comments. When a revised edition of the report is completed it could again be submitted to the DRO for a second review. This would be an iterative process until the report is finally accepted by the DRO.

IV. Training Scheduling/Event Planning

A high priority requirement was to develop an electronic means of disseminating scheduled events. The desire is to have a divisional calendar which would depict all of the division level events (i.e., guard weekend events, major field training exercises, ranges, etc.)

- **Entities affected:** All 13,500 members who have a personal computer and a modem could check the web-based calendar for timely scheduling information
- **Number of users:** see above
- **Primary owner:** Either the G-1 or G-3 would maintain an up-to-date schedule. Most likely the G-1. Personnel staffers at all echelons (i.e., brigade S-1s and battalion S1s) will most likely want to maintain their own calendars at their own level.
- **Frequency of use:** continuous
- **Frequency of update:** as necessary when events are added, changed, or deleted
- **Mode of use by entities:** read only
- **Type of information:** scheduling
- **Source of information:** primary staff input
- **Current Status:** Division uses calendar creator plus a calendar application. These calendars are manually distributed or sent via fax
- **Miscellaneous information:** In regards to policy, someone will have to make the decision who will maintain the division's calendar. Typically the G-3 has most of the input (range schedules, field exercises, etc.) but the G-1 is the commander's administrative arm.

During requirements gathering, we interviewed each of the four primary staff elements (G-1 through G-4). During this process we gathered some requirements that were not necessarily a priority but fell into the "nice to have" category. We gave most of them consideration if they could be done very quickly without too much difficulty. The following paragraphs speak to some of the "nice to have" we put in the prototype.

APPENDIX D. GUIDANCE FOR THE MANAGEMENT OF ARMY WEBSITES

Guidance for the Management of Army Websites

30 October 1996

Releaser: LTG Otto J. Guenther, DISC4

1. References:

- A. Public Law 100-235, Computer Security Act of 1987.
- B. AR 360-5, Public Information (31 May 1989).
- C. AR 25-55, Army Freedom of Information Act Program (10 Jan 1990).
- D. AR 380-19, Information System Security (1 Aug 1990).
- E. AR 380-5, Department of the Army Information Security Program (25 Feb 1988).
- F. AR 340-21, Army Privacy Act Program (5 Jul 1985).
- G. AR 25-1, The Army Information Resource Management Program (24 May 1991).
- H. Memorandum, Deputy Secretary of Defense, 17 Feb 1995, Subject: Clearance Procedures for Making Electronic Information Available to the Public.

2. Purpose: This message provides initial guidance for the establishment and operation of Army world wide websites ("websites"). A final policy is being coordinated.

3. This guidance applies to all Army organizations that maintain publicly accessible, non-restricted websites.

4. The world wide web (WWW) is an efficient and effective means for the U.S. Army to share information. Army websites should focus on providing value-added information services and products to the organization's users, customers, the Army, and the public through the sharing of accurate, relevant information. Army Websites can enhance the execution of the Army's mission through information sharing, and save resources currently expended on traditional means of communication. To ensure that the Army fully leverages the capabilities of the WWW in a manner that is efficient, focused on saving resources, and moving toward a digital environment, the following guidelines are provided.

5. The organization's leadership should evaluate the website's ability to provide value-added service, enhance the execution of the organization's missions and functions, or realize efficiencies when determining whether their organization, or subordinate organization, should develop or continue to maintain websites.

6. The organization's leadership is ultimately responsible for the content of the organizations website and compliance with Army policy. The organization's leadership

will have knowledge of the websites operated by their command and subordinate commands, and the information provided to the public through these websites.

7. Army websites will provide the following information or hyperlinks to the following information on their homepage: (a) organization missions and functions; (b) organizational structure, listing or hyperlinking to parent and subordinate command or organization websites (organizational charts containing individuals' names and other personal information should not be uploaded unless privacy and security concerns have been addressed; posting such information for members of deployable units and others in sensitive positions could make them potential targets of hostile organizations or individuals); (c) electronic mail address, phone number, or mail address of point of contact responsible for the website content; (d) a hyperlink to the U.S. Army homepage (<http://www.army.mil>).

8. No classified, unclassified but sensitive, information that cannot be disclosed under the Privacy Act, For Official Use Only (FOUO), or Freedom of Information Act (FOIA)-exempt information (such as draft policies and regulations, or pre-decisional information) will be made available to the public through WWW. Each organization will institute a review process to ensure that information provided on their website is current, timely, and cleared for public release.

9. To ensure that a user entering any Army website can reach a central source for accessing all other Army websites, every organization that maintains a website must: (a) register their homepage with the U.S. Army homepage webmaster through the online registration form found on the Army homepage; (b) provide a hyperlink to the U.S. Army homepage on their homepage.

10. Personal use of government resources generally is improper. Hyperlinks on official Army websites to personal homepages or websites are prohibited.

11. Commercial advertising on official U.S. Army websites is prohibited. Corporate or product logos and trade marks are considered commercial advertisements, and may not be served from official U.S. Army websites.

12. Website/document points of contact ("webmaster") will: (a) ensure that information published on their website is accurate, timely, represents the official Army position, and is properly cleared for public dissemination; (b) ensure appropriate security and access controls are in place, commensurate with the perceived threats, and to ensure that information which is classified, unclassified but sensitive, information that cannot be disclosed under the Privacy Act, For Official Use Only (FOUO), or Freedom of Information Act (FOIA)-exempt information (such as draft policies and regulations, or pre-decisional information) is not made available to unauthorized individuals or organizations; (c) provide the highest possible level of assurance that information made available to or received from the public does not contain malicious software code such as viruses, trojan horses, logic bombs, bacteria and worms, or if it does, to sufficiently

notify the user before the download of such information begins; (d) respond to customer or user email and direct queries or requests for information to the responsible party within the organization; (e) ensure that the organization's website provides point of contact information.

13. Point of contact: Mr. Christopher Unger, webmaster@hqda.army.mil, commercial (703) 275-9500, DSN 235-9500.

14. One Voice for the Army!

<Picture>to u.s. army homepage
<Picture>questions for webmaster@hqda.army.mil
<Picture>security & privacy notice
<Picture>last update: 19970115

LIST OF REFERENCES

[Citation by number]

- 2.1 *What Is An Intranet?*,
<http://pathfinder.com/@@8FhsWAQAIf5mDr2/fortune/specials/Intranets/what/index.html>
- 2.2 Sridhar S., *Decision Support Using the Intranet*, p.14, Monterey, CA, 1997.
- 2.3 *What Is An Intranet?*,
<http://pathfinder.com/@@8FhsWAQAIf5mDr2/fortune/specials/Intranets/why/index.html>
- 2.4 *Client/server model of computing*,
<http://emorgan.lib.ncsu.edu/teaching/manuscript/0200-client-server.html>
- 2.5 Kessler, M.G., *Intranets: Open Messaging Technology and Opportunities for User Driven Information Spaces*, p.130, Boca Raton, FL.
- 2.6 Ibid.
- 2.7 Evans, T., *Building An Intranet*, pp.117-140, Sams.net Publishing, 1996.
- 2.8 Evans, T., *Building An Intranet*, p. 10, Sams.net Publishing, 1996.
- 2.9 Microsoft Office Intranet Strategy,
<http://www.microsoft.com/office/office97/documents/office/Intranet/moiwp3.htm>
- 3.1 J.P. Combs, 40th Infantry Division (MECH) 1917-1997, p.6, 1997.
- 3.2 B.W. Willand, 40th Infantry Division (MECH), Briefing, 1997.
- 3.3 J.P. Combs, 40th Infantry Division (MECH), 1917-1997, p.38.
- 3.4 Reserve Component Automation System (RCAS), Validation Assessment Team, Final Report, Executive Summary, p.1, 21 July, 1995.
- 3.5 Ibid.
- 3.6 Ibid., p.63
- 3.7 Ibid., p.12
- 3.8 Reserve Component Automation System, System Level Design Review (SLDR), briefing presented 20 August, 1996.
- 3.9 Reserve Component Automation System (RCAS), Validation Assessment Team, Final Report, Executive Summary, p.18, 21 July, 1995.

- 3.10 Ibid.
- 3.11 Ibid., p.20
- 3.12 Ibid., p.21
- 3.13 Ibid., p.39
- 3.14 Reserve Component Automation System, System Level Design Review (SLDR), briefing presented 20 August, 1996.
- 3.15 Ibid.
- 4.1 K.C. Laudon & J. P. Laudon, *Essentials of Management Information Systems*, p. 272, Prentice-Hall, 1995.
- 4.2 P.W. Jordan, et al, *Software Storming: Combining Rapid Prototyping and Knowledge Engineering*, p. 39, Computer, May 1989.
- 4.3 W.W. Agresti, *New Paradigms for Software Development (Tutorial)*, p. 4, Computer Society Press, 1986.
- 4.4 K.C. Laudon & J. P. Laudon, *Essentials of Management Information Systems*, p. 273, Prentice-Hall, 1995.
- 4.5 S. Yacoob (Philips Electronics), *Paving the Way for Software Prototyping*, p. 8/4, Report for IEE Colloquim on Prototype Development, London, 1992.
- 4.6 K.C. Laudon & J. P. Laudon, *Essentials of Management Information Systems*, p. 285, Prentice-Hall, 1995.
- 4.7 J. Crinnion, *The Evolutionary Development of Business Systems*, p. 3/3, Report for IEE Colloquim on Prototype Development, London, 1992.
- 4.8 V.S. Gordon & J.M. Bieman, *Rapid Prototyping: Lessons Learned*, p.91, IEEE Software, January 1995.
- 4.9 M. Alavi, *An Assessment of the Prototyping Approach to Information Systems Development*, Volume 27, Number 6, p. 92, Communication of the ACM, June 1984.
- 4.10 J. Crinnion, *The Evolutionary Development of Business Systems*, p. 3/10, Report for IEE Colloquim on Prototype Development, London, 1992.

- 4.11 R. V. Giddings, *Accommodating Uncertainty in Software Design*, Volume 27, Number 5, p. 429, Communications of the ACM, May 1984.
- 4.12 T. Taylor & T. A. Standish, *Initial Thoughts on Rapid Prototyping*, Volume 7, Number 5, p. 161, Software Engineering Notes, December 1982.
- 4.13 K.C. Laudon & J. P. Laudon, *Essentials of Management Information Systems*, p. 271, Prentice-Hall, 1995.
- 4.14 J. Crinnion, *The Evolutionary Development of Business Systems*, p. 3/7, Report for IEE Colloquium on Prototype Development, London, 1992.
- 4.15 V.S. Gordon & J.M. Bieman, *Rapid Prototyping: Lessons Learned*, pp. 92-93, IEEE Software, January 1995.
- 4.16 M. Alavi, *An Assessment of the Prototyping Approach to Information Systems Development*, Volume 27, Number 6, p. 93, Communication of the ACM, June 1984.
- 4.17 A. M. Davis, *Operational Prototyping: A New Development Approach*, p. 71, IEEE Software, September 1992.
- 4.18 V.S. Gordon & J.M. Bieman, *Rapid Prototyping: Lessons Learned*, p. 93, IEEE Software, January 1995.
- 4.19 D. Y. Tamanaha & P. J. Bourgeois (Hughes Aircraft), *Rapid Prototyping of Large Command, Control, Communications and Intelligence C³I Systems*, p. 260, IEEE Aerospace Applications Conference Digest, 1990.
- 5.1 G. Holmes, Logistics Automated Support System Office, 40th Infantry Division (MECH), Meeting, 19 December 1996. -
- 7.1 Of Security Policies and Intranets, Network World, 21 October, 1996.
- 7.2 T. Campbell, Intranet-iquette: 7 Steps to a Successful Intranet, <http://home.microsoft.com/reading/archives/tech-3-24.asp>
- 7.3 Ibid.
- 7.4 Ibid.
- 7.5 S. Cohen, Inside Job: A Guide to Intranets, American Society for Training & Development, October, 1996.
- 7.6 C. Comaford, It Takes a Team to Raise an Intranet, PC Week, 11 November, 1996.

7.7 P. Schnaidt, Ask Hard Questions Before You Intranet, Network Computing, 15 April, 1996.

INITIAL DISTRIBUTION LIST

1. Defense Technical Information Center2
8725 John J. Kingman Rd., STE 0944
Ft. Belvoir, Virginia 22060-6218

2. Dudley Knox Library2
Naval Postgraduate School
411 Dyer Rd.
Monterey, California 93943-5101

3. Dr. Suresh Sridhar, Code SM/Sr.....3
Department of Systems Management
Naval Postgraduate School
Monterey, California 93943-5101

4. California Army National Guard1
40th Inf Division (Mech)
Attn: BG Edmund C. Zysk
11200 Lexington Drive
Building 3
Los Alamitos, California 90720-5002

5. California Army National Guard1
40th Inf Division (Mech)
Attn: COL James P. Combs
11200 Lexington Drive
Building 3
Los Alamitos, California 90720-5002

6. California Army National Guard1
State Military Department
Attn: Automation Branch Chief Dave Tollefson
9800 Goethe Road
Sacramento, California 95826

7. California Army National Guard1
240th Signal Battalion
Attn: Executive Officer
2320 N. Parmelee Avenue
Compton, California 90222-1711

8. LTC Rod Barham.....1
12417 Shropshire Lane
San Diego, California 92128

9. Mr. and Mrs. Myron R. Olson1
1716 69th St.
Des Moines, Iowa 50322
10. Major Nelson T. Heckroth2
364 Pine Ave.
Pacific Grove, California 93950
11. Major Thomas M. Olson.....2
325 Metz Rd.
Seaside, California 93955